DOCUMENT RESUME

ED 035 431 52 LI 001 836

AUTHOR	Fasana, Paul J.; And Others.
TITLE	A Computer Based System for Reserve Activities in a University Library.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-7-1129
PUB DATE	Sep 69
GRANT	OEG-1-7-071129-5047
NOTE	109p.
EDRS PRICE	EDRS Price MF-$0.50 HC-$5.55
DESCRIPTORS	*Automation, Booklists, Classroom Materials, Computer Programs, Electronic Data Processing, *Information Systems, Library Circulation, *Library Collections, Library Services, *Library Technical Processes, Textbooks, *University Libraries
IDENTIFIERS	*Columbia University Library System

ABSTRACT

After a detailed study of the reserve processing activities of the Columbia University Library System, it was decided that an attempt to design a reserve system which would make the fullest use of computers would be undertaken. This would be an integrated system developed over a period of time in a series of clearly defined phases. Three different phases were distinguished which could be developed in series or simultaneously, depending on such factors as operating software and hardware availability. After three years a fully tested system, called Reserves Processing has been developed for Phase One and implemented in two working environments. The Reserves Processing system accepts input in the form of brief bibliographic citations, inventory data and course information, creates a master machine stored reserve file, produces a variety of records to assist in the processing of reserve books, and prints a variety of lists to be used for reference purposes. All of these operations, except input, are done as off-line, batch-processed operations. Only input is done in an on-line mode. This report includes a general systems description intended for the non-technical reader as well as program and hardware specifications and intended for the technical reader. (Author/JB)

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ED035431

FINAL REPORT
Project No. 7-1129
Grant No. OEG-1-7-071129-5047

A COMPUTER BASED SYSTEM FOR RESERVE ACTIVITIES IN A UNIVERSITY LIBRARY

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The research reported herein was performed pursuant to a grant with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

September 1969

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1. INTRODUCTION AND SUMMARY

1.1. Changing Patterns of University Instruction and Their Effect on the Library.

During the past twenty years methods of instruction in colleges and universities have changed significantly. The effect on the library has, in general, been subtle but pervasive. In certain instances, though, change has caused acute problems. An example of such a problem area is that of "course reading".

The tendency in the past 10 to 20 years has been away from using a single text-book for a course and toward using selected readings from a number of sources. As a result, the academic library has had to assume an active role in the teaching process by providing special reference and reading service to students. Since students are no longer required to buy all texts that they will read in a course, the library has had to provide this support through special "reserve" collections containing multiple copies of a title.

1.2. The Concept of Reserve Collections and Procedures.

Libraries have developed the concept of "the reserve collection," together with special procedures, to handle the problem of course reading. This has solved certain problems but in turn created others. Examples of the range of problems that have arisen as a result of the reserve collection concept are the following:

1. Creation of a large but temporary collection of books
2. Movement of large quantities of books onto and off reserve status
3. Creation of special records for controlling reserve processing
4. Short term, sometimes hourly, circulation
5. Information service to students and professors

1.3. A Functional Description of the Reserve Process.

The major functions (or activities) of reserve processing are as follows:

1.3.1. Identify titles to be included. Since titles included in a reserve collection change from semester to semester, the library must communicate with professors in advance of a semester to find out what titles will be needed. Once this is known the library must establish whether the titles are owned and in what quantity they are available.

1.3.2. Assemble the reserve collection. Because of the unique reference and circulation procedures, reserve collections are usually housed in a special location. This requires that volumes be moved creating significant logistical problems, since the movement of books must usually be done in a short period of time. This is further aggravated by the fact that once a semester is finished, the reserve collection must be broken up and returned to its original location. Often times this assembling and disbursing of books occur at the same time.

1.3.3. Create records for control and reference. Various records are produced expressly for the reserve operation. Each of these records is a reformatting or rearrangement of a limited number of data elements. These include a highly abbreviated set of bibliographic data (e.g., author, simple title, and date), course information, and inventory.

1.3.4. Provide inventory control. A complete, accurate, and up-to-date record of the number of copies of a title is essential at each step in the processing cycle and for reserve reference service.

1.3.5. Provide reference service. Rapid identification and location of materials is essential for reserve reference service. Simple reference (or look-up) procedures allowing the highest degree of patron self-service, is desirable.

1.3.6. Provide circulation control. Large numbers of books are checked out for short periods of time. Circulation procedures must be simple, accurate, and up-to-date.

1.4. Reserve Collections and Procedures within the Columbia University Libraries.

In order to understand the complexities and magnitude of reserve operations, a brief description of reserve procedures at Columbia University is given in the following section. While details of operation and volume of transactions between Columbia and other academic libraries may differ, the basic functions performed are similar regardless of size or subject. This assumption is based not only on analysis of the various different reserve environments within the Columbia system but also reserve activities in other colleges and universities.

The Columbia University Library System is made up of 36 separate department libraries, each specializing in a subject area or serving a particular department. More than half of these libraries maintain specialized reserve collections and provide reserve service. In any one semester, the variation of reserve activity among these libraries is wide, ranging from several titles in Philosophy Library to 8,000 titles in the College Library. In order to understand the types of problems encountered in a typical reserve environment, a brief overview of the College Library reserve activities would be helpful.

Approximately 400 reserve lists are received from professors each semester. A list may contain anywhere from 1 to 150 titles, with an average of about 15 - 25 titles per list. Each list must be individually processed; this requires that each title be searched and verified in catalogs and printed indexes. Once identified, the physical volumes must be assembled from existing bookstocks, through inter-library loan, or specially ordered, and special records must be created to control the reserve collection.

The amount of effort expended in this one Library alone is enormous. The efficiency with which it was done and the resultant service was seriously hampered by the following factors.

1.4.1. Critical scheduling. Reserve lists from professors were expected shortly before the beginning of each semester and books were expected to be available by the time the first class met for that semester. A significant percentage of professor's lists arrived late. Processing of books onto reserve status was a major effort done under extreme pressure and with limited staff. The difficulty was compounded by the fact that reserve books from the previous semester were deprocessed during the same period.

1.4.2. Volume of work. A typical reserve list had, on an average, 15 titles; each title required an average of 5 copies. This meant that approximately 20,000 to 30,000 physical items were involved in reserve processing each semester; this did not include books being deprocessed from reserve status from the previous semester. A complicating factor was that since there was no way of knowing when a particular title would be used, processing of books either onto or off of reserve status was done as a single, massive effort.

1.4.3. Records. Every title placed on reserve required at least three special reserve records; work records, public reference records, and circulation records. Roughly, twenty to fifty thousand records were specially typed each semester.

1.4.4. User service. Servicing of the reserve collection was entirely separate from regular reference and circulation activities. User service was severly hampered because of the following factors:

1. Lack of complete, up-to-date records

2. Significant book losses during the semester making inventory records even more inaccurate

3. Ignorance as to which titles were used and how often. (This last factor severly hampered the librarian's ability to decide how many copies of a title should be provided and to plan or schedule reserve processing efficiently.)

1.5. An Approach to the Solution of the Reserve Problem.

After detailed study of these factors it was decided that:

1. Reserve functions are fairly autonomous and have minimal contact (or interface) with other library activities. Therefore, it would be feasible to design, develop, and implement a new reserve system without disturbing or dislocating other library operations.

2. Many of the activities essential to reserve processing, such as inventory control, repetitive typing, data handling, and record creation, are ideally suited to the capabilities of computers. Therefore, the design of a new reserve system should explore the possibility of using computers wherever possible.

3. The one aspect of reserve processing which seems to vary from one system to another is the volume of work handled. All other operations performed display a high degree of similarity. If computers are used, differences in processing volume become less critical. Therefore, the desirability of designing a computer-based reserve system which is general and transferable is greatly increased.

1.6. What Was Done.

As a result of these conclusions, it was decided that an attempt to design a reserve system which would make the fullest use of computers would be undertaken.

The reserve activities of several departmental libraries within the Columbia University Library System, having varying processing volumes and serving different subject areas, were studied and specifications for a single, generalized system design were formulated to satisfy the requirement of each of the various reserve systems studied. Emphasis in this preliminary design phase focused on identifying and defining reserve functions common to all reserve environments observed. Once accomplished, these specifications were reviewed with a number of working librarians to establish whether all requirements of the reserve activity had been satisfied. In addition, reserve environments outside the Columbia Library System were studied and compared with the preliminary reserve specifications. Very few modifications or changes to the original set of specifications were necessary.

1.7. Developing a Computer-Based System.

Translating the abstract functions identified and described in the preliminary set of specifications into a practical working system was then undertaken. Ideally, a fully on-line, real-time, interactive mode of computer operation was deemed necessary to satisfy the complete range of processing activities. But this possibility, though technically feasible with third generation computers, was not achievable on a practical level at that time (nor is it today). Therefore, the objective of designing and implementating a total reserve processing system in one step was discarded and replaced with the concept of developing an integrated system over a period of time in a series of clearly defined phases or steps.

Three different phases were distinguished and described which could be developed in series or simultaneously, depending on such factors as operating software and hardware availability. In Phase One, a master reserve file in machine readable form would be created integrating input activities, inventory control procedures, and the production of records for internal processing and reference. In a second phase, on-line circulation control and inventory monitoring procedures would be developed and integrated. In a third phase, reserve processing would be integrated with a master bibliographic system.

The time frame estimated at that time (1967) to achieve all three phases was three to five years. Time estimates of this sort tend to be optimistic. Today, after three years of work, only Phase One has been fully realized. Various aspects of Phase Two have been developed or experimented with, including a fully operational off-line circulation system. Virtually nothing of Phase Three has been accomplished excepting for preliminary specifications. Present time estimates for the development and implementation of all three phases call for an additional three to four years (roughly two years beyond our original estimate).

At present a fully tested system, called Reserves Processing has been developed for Phase One and implemented in two working environments. The Reserves Processing system as it operates at present accepts input in the form of brief bibliographic citations, inventory data and course information, creates a master machine stored reserve file, produces a variety of records to assist in the processing of reserve books, and prints a variety of lists to be used for reference purposes. All of these operations, except input, are done as off-line, batch-processed operations. Only input is done in an on-line mode.

The remainder of this report is devoted to describing the Reserves Processing System. Part 2 of this report is a general systems description intended for the non-technical reader. Part 3 contains program and hardware specifications and is intended for the technical reader.

2. SYSTEM DESCRIPTION

2.1. Objectives.

The Reserves Processing System was designed to fulfill the following general objectives.

2.1.1. Personnel. To stabilize (or reduce) personnel requirements both professional and clerical for reserve activities. Reserve processing volume has exhibited during the past decade a geometric growth, with the number of titles processed doubling every five to six years. Assuming that this exponential growth will continue and the present manual system is maintained, personnel requirements by 1970 will have increased by 20 to 30 percent, by 1975 they will have increased by 60 to 70 percent.

2.1.2. Efficiency. To increase processing efficiency of reserve activities. Manual procedures have been expanded to what seem to be their logical limits. There is serious doubt that the simple expediency of adding more personnel will adequately solve the problem of increasing volume. In essence, it is highly likely that manual procedures will be unable to handle the reserve processing volume by 1975. Alternate methods using new technologies, especially computers, offer at present the best, possible solution.

2.1.3. Control. To achieve greater control over internal book processing and inventory control activities. With an ever increasing volume of reserve books to be handled, the ability of the librarian to control the movement and inventory of these books is seriously threatened. As this ability to control is reduced, the quality and level of service is adversely affected.

2.1.4. Core collection. To gain a more precise and quantitative understanding of the reserve collection. A seemingly significant percentage of the same titles (30 percent or more) are used from one semester to another. In addition, in any one semester a large number of courses require the same titles. This suggests that a "core collection" of reserve titles exists which are identifiable.

2.1.5. Use Patterns. To gain a more precise understanding of the use made by students of reserve collections. The number of titles placed on reserve by professors increases but the actual use by students of these titles is unknown and suspect. Intuitively the librarian feels that his estimate of the number copies of a title that are placed on reserve and the actual use of reserve books by students do not correlate.

2.1.6. Cost. To reduce the overall cost of the reserve operation. It seems that using computers will stabilize personnel costs over the next ten years. In addition, the increased control and reporting capability which computers provide may be able to stabilize, or possibly reduce, book costs through greater control of book handling procedures, better understanding of reserve use patterns, and more precise knowledge of the nature of the reserve book collection.

2.1.7. Scheduling of Reserve Processing. To ascertain when during a semester a title will be used. Professor's Reserve Lists are received at the beginning of a semester and, since it has been impossible to establish when a title will actually be needed (and even if it were known it would be difficult to use this information efficiently in a manual system), the librarian has processed large numbers of titles onto reserve status in the shortest period of time. This has created a situation wherein impossible and inefficient work loads occur during the first weeks of a semester. The ability of the computer to review large amounts of data rapidly offers the possibility of using computers to schedule processing activities and eliminate inefficient workloads.

2.1.8. Accuracy. To increase the accuracy and currency of records used for inventory control. Because of the uneven nature and the extreme pressure under which reserve processing is done, inventory and control records are often inaccurate and incomplete, seriously degrading the efficiency of other parts of the system. A simple, accurate method for creating records and storing data is necessary. The computer has the ability to store large quantities of data and to update it rapidly and accurately.

2.1.9. Growth. To design a system which can accommodate future growth. The computer can accept an increasing volume of data without a corresponding increase in processing time.

2.1.10 Flexibility. To design a system which is flexible and able to accommodate change. Reserve procedures are continually changing. The rate of change will be accelerated as better understanding of the nature of reserve activities is gained.

2.1.11. Service. To design and implement a system which is simple and efficient for students and professors to use. With the increased efficiency of internal procedures, more staff will be released to extend better service to users.

2.1.12. Generalized (or Transferable) Systems. To design a system which is general enough to be transferred and used in a number of reserve environments. This becomes especially desirable if a computer-based system is envisioned because of the high cost of developing and writing computer programs. (Certain of these objectives, such as core collection identification, automatic scheduling and user pattern evaluation, are only partially achieved in the Reserve Processing System as it is implemented at present. Complete realization of all of these objectives will only be attained when the integrated system has been completely developed, implemented, and run for a period of time.)

2.2. Overview.

All processing activities and products of the Reserve Processing System are organized around a single file, called the Master Reserve File, which is stored on randomly accessed computer disc packs. The Master Reserve File contains virtually all titles that have been used for reserve since the initiation of the system. Initially, or the first semester the system was used, this meant that considerable conversion effort was necessary to create a basic file, but with each succeeding semester, input effort has been greatly reduced. Though there probably will never be a time when new input will be entirely eliminated, the number of new titles that will have to be input at the beginning of each semester will be relatively small and stable.

New titles are entered into the Master Reserve File by encoding bibliographic, inventory, and course information. Bibliographic information is permanent and remains in the master file indefinitely. Inventory information varies reflecting the total number of copies available at any point in time. Course information is input as received (usually at the beginning of a new semester) causing the status of a title (e.g., on active reserve) to change; as course information is superseded, it is preserved temporarily in the master file and then released to a permanent historical file.

Input is done using on-line computer terminals, keypunches, or tape typewriters. File updating and processing is done in a "batch" mode and on whatever cycle is best suited to the existing need (e.g., daily during peak processing periods, on demand during slack periods).

The basic function of the main processing program is to review course requirements and compare them with the available inventory for each title being placed on active reserve. If there is a copy shortage the library is notified. If copies are available, inventory cards for each copy to be placed on reserve are produced. Various lists and products both for internal use by library staff and for public reference use are also produced. The most important lists produced are Master Worklists to assist the librarian in controlling bibliographic, course, and inventory processing; a Public Reference List used by patrons to identify books on active reserve; and Course Lists used for public reference and to notify professors of titles on reserve for the current semester.

The most important products are processing cards (called ON and OFF, cards used to control the physical movement of books from storage or some other location to the reserve shelves.

A number of auxiliary programs are available to produce special lists, such as historical statistics, sequence lists, cross reference lists, and professor's lists.

The net effect of the system is tighter control over all aspects of processing by the librarian, a reduction of clerical effort, the ability of being able to spread out work over a longer period of time, and better service to students and professors. (See Figures 1-4).

2.3. Input

2.3.1. Data Collection and Verification. Four kinds of data are used in the system: bibliographic, inventory, course, and order information. Data are gathered from various sources. Bibliographic information is taken from library card catalogs; inventory information is taken from official shelf lists; course information is taken from lists supplied by professors in the form of course reading lists; and order information is taken from order files.

The collection cycle is initiated by the library sending request forms (See Figure 5), instruction sheet (See Figure 6), and a cover letter (Figure 7) to all professors scheduled to teach courses during a particular semester. The forms are sent well in advance of the beginning of the semester to allow enough time for professors to complete them and return them prior to the beginning of the semester (approximately one month before). The library begins processing of completed forms as they are returned. The processing cycle is initiated by a librarian who reviews all completed forms, checking for obvious errors, and adding copy requirements based on expected enrollment, past experience, and probable availability of multiple copies. (This last step is at present an ambiguous and intuitive process; a feature of the system which is not yet completely developed is to accumulate and record data that can be used to assist the librarian in this decision process.)

The processing cycle from this point on becomes almost entirely a clerical effort consisting of checking existing files to verify titles, ascertaining actual availability and inventory, and reporting to the machine system. The librarian is consulted only when a problem arises.

2.3.1.1. Course Information. Course information is made up of the following data elements:

a) Professor's name
b) Course number(s)
c) Number of copies required
d) Semester(s)

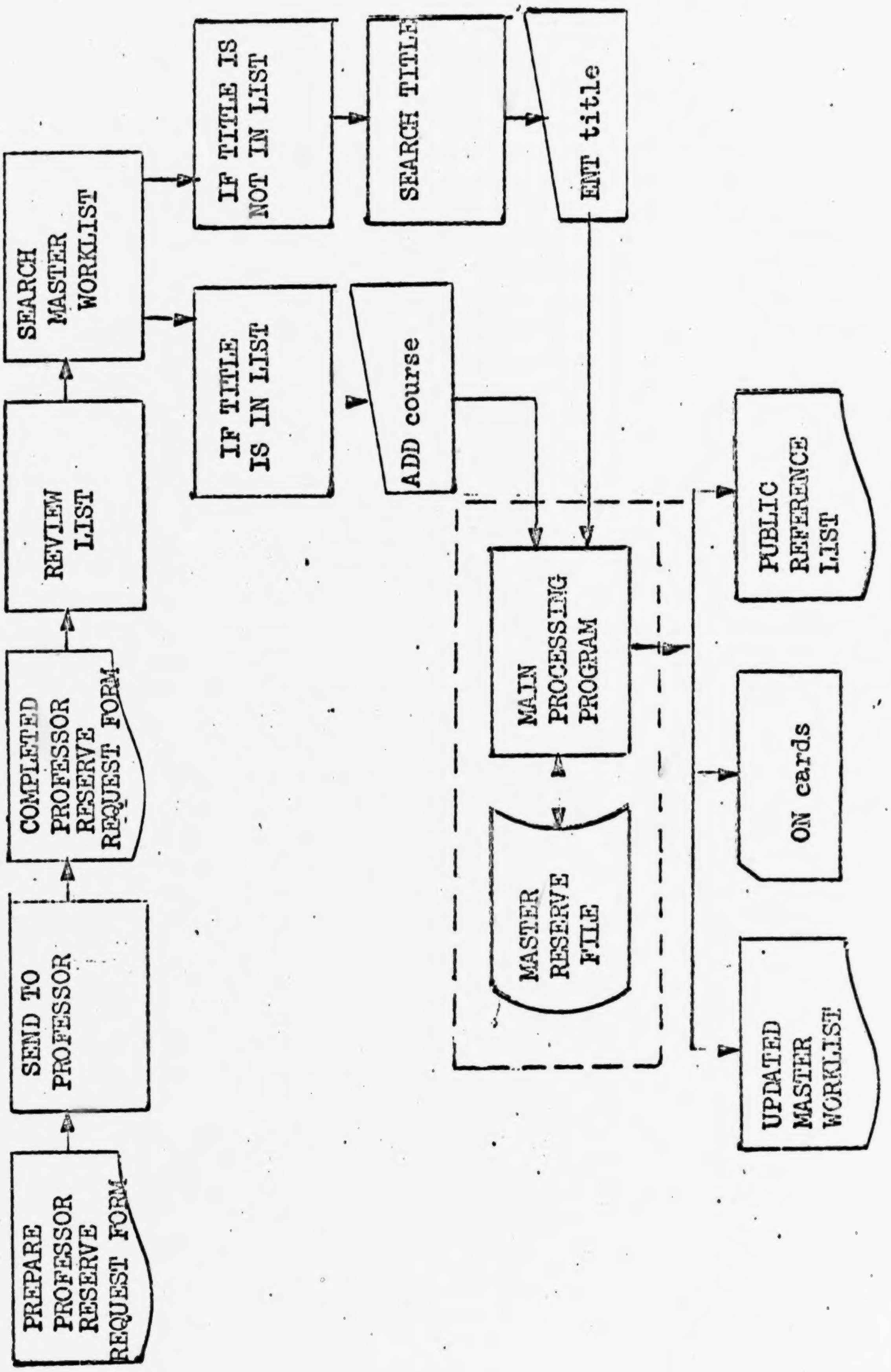

PREPARE PROFESSOR RESERVE REQUEST FORM
SEND TO PROFESSOR
COMPLETED PROFESSOR RESERVE REQUEST FORM
REVIEW LIST
SEARCH MASTER WORKLIST
IF TITLE IS IN LIST
IF TITLE IS NOT IN LIST
ADD course
SEARCH TITLE
ENT title
MAIN PROCESSING PROGRAM
MASTER RESERVE FILE
PUBLIC REFERENCE LIST
ON cards
UPDATED MASTER WORKLIST

FIGURE 1
PROCESSING PROFESSOR
RESERVE REQUEST LISTS

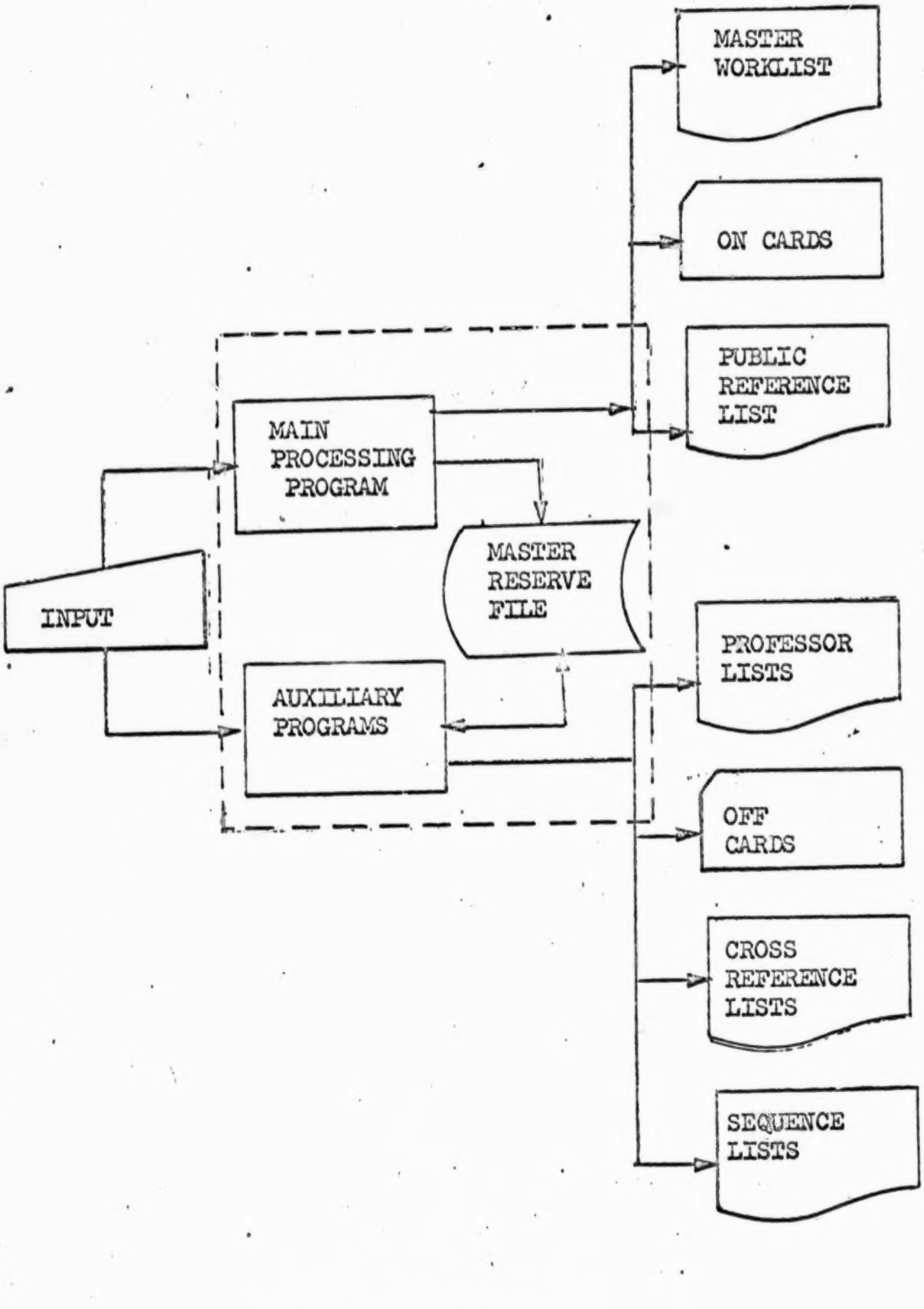

MASTER WORKLIST
ON CARDS
PUBLIC REFERENCE LIST
MAIN PROCESSING PROGRAM
MASTER RESERVE FILE
INPUT
AUXILIARY PROGRAMS
PROFESSOR LISTS
OFF CARDS
CROSS REFERENCE LISTS
SEQUENCE LISTS

FIGURE 2
BLOCK DIAGRAM - RESERVE PROCESSING

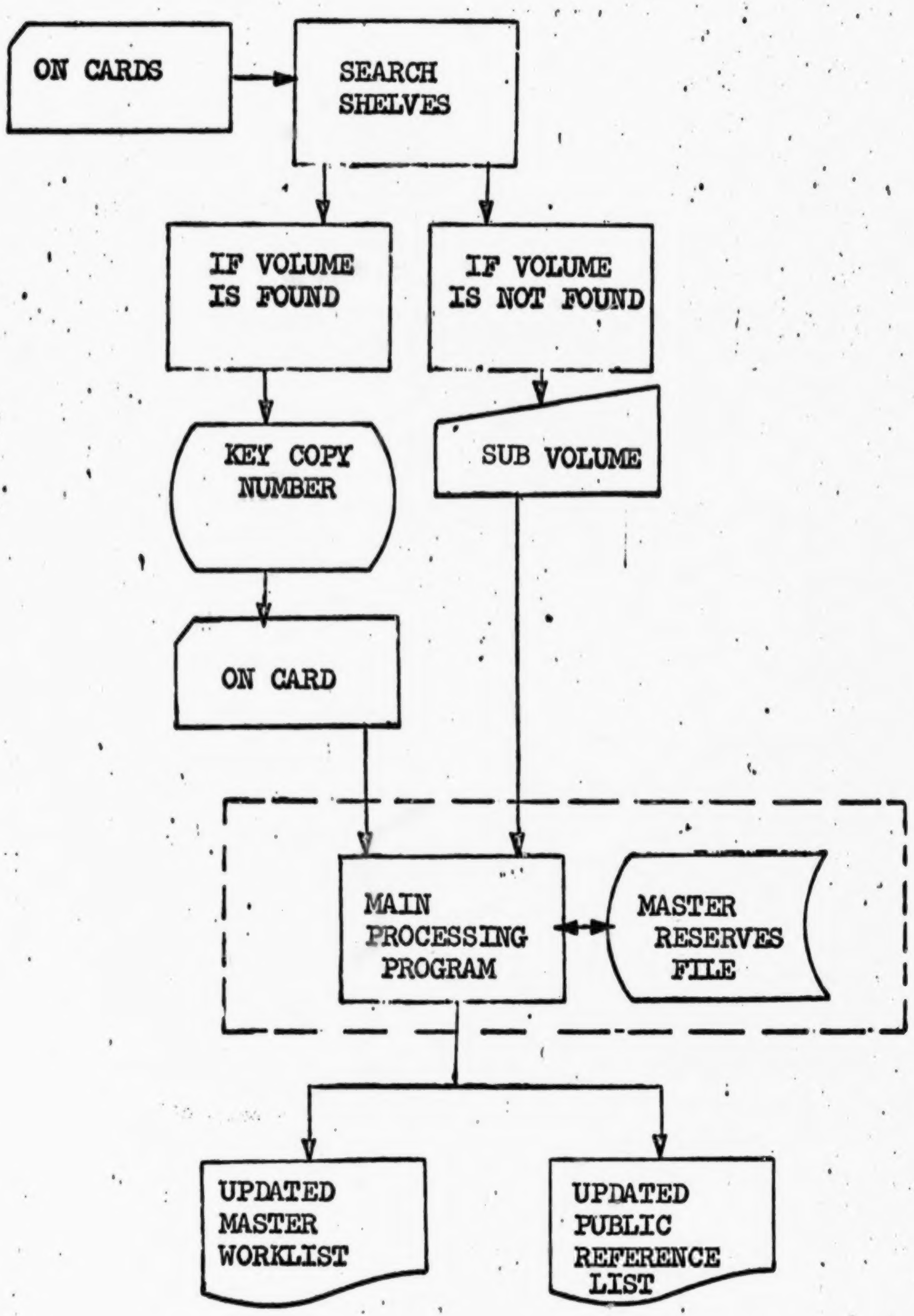

ON CARDS
SEARCH SHELVES
IF VOLUME IS FOUND
IF VOLUME IS NOT FOUND
KEY COPY NUMBER
SUB VOLUME
ON CARD
MAIN PROCESSING PROGRAM
MASTER RESERVES FILE
UPDATED MASTER WORKLIST
UPDATED PUBLIC REFERENCE LIST

FIGURE 3
PROCESSING BOOKS ONTO RESERVE STATUS

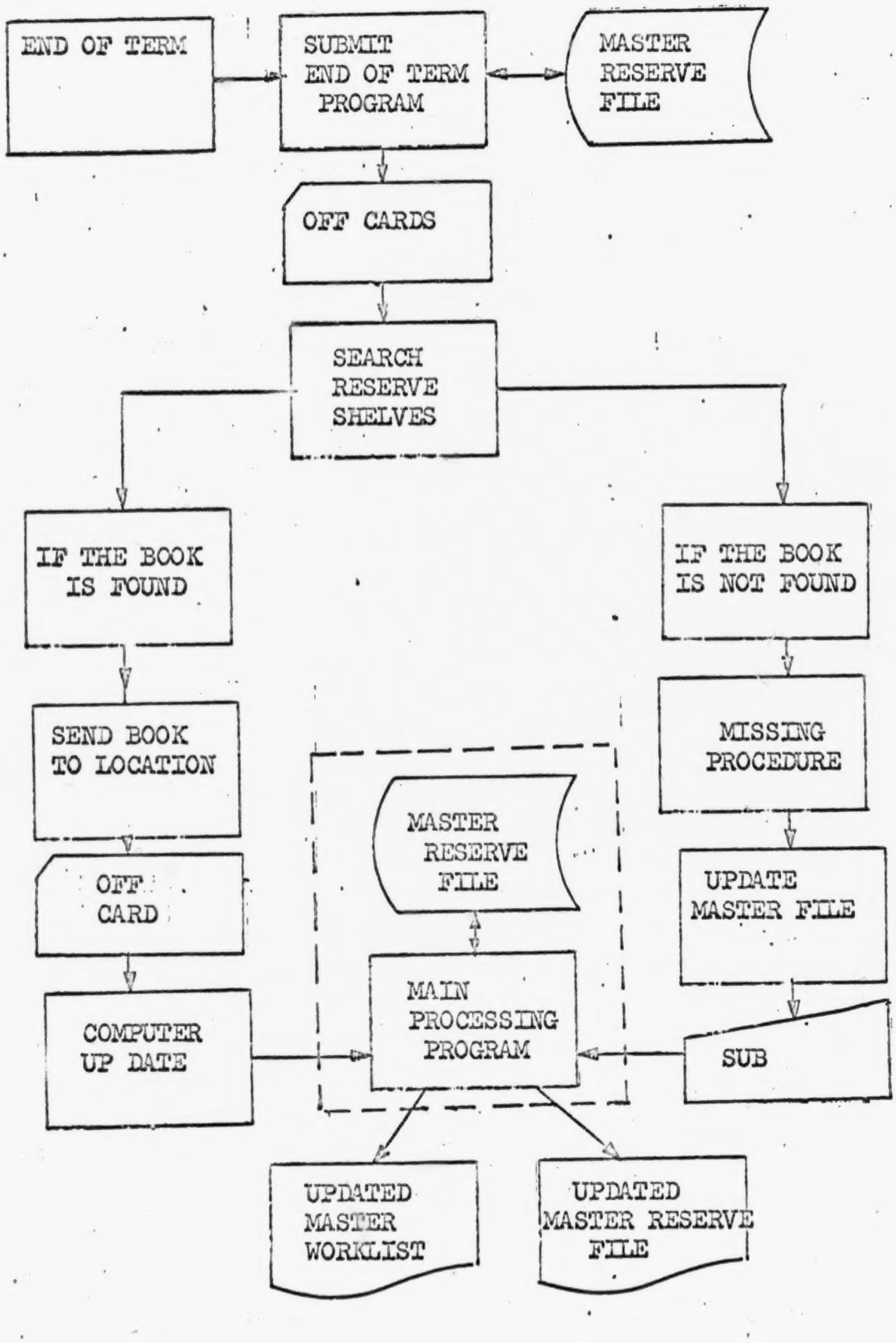

END OF TERM
SUBMIT END OF TERM PROGRAM
MASTER RESERVE FILE
OFF CARDS
SEARCH RESERVE SHELVES
IF THE BOOK IS FOUND
IF THE BOOK IS NOT FOUND
SEND BOOK TO LOCATION
MISSING PROCEDURE
MASTER RESERVE FILE
OFF CARD
UPDATE MASTER FILE
MAIN PROCESSING PROGRAM
COMPUTER UP DATE
SUB
UPDATED MASTER WORKLIST
UPDATED MASTER RESERVE FILE

FIGURE 4
PROCESSING BOOKS OFF RESERVE STATUS

2.3.1.2. Bibliographic information. At present, minimal bibliographic data is included in the system. (In a future version of the system when a master bibliographic file is available, this part of the record may be augmented and taken automatically from the master file.) Bibliographic information consists of:

a) Author (Full Name)
b) Title (Usually Short Title Only)
c) Edition Statement
d) Date
e) Call number
f) Location (i.e., the particular collection from which copies are being taken)
g) Cross References

If a title already exists in the Master Reserve File (established by checking the Master Worklist) a message is sent to the computer and inventory processing is initiated automatically.

If a title does not appear in the Master Worklist, a search form, called a Verification Form, (Fig. 8), is filled out and checked against the main library catalog, where main entry is verified, call number added and any missing information supplied. If a title is not in the main catalog, the search form is sent to the order process.

2.3.1.3. Inventory Information: Inventory information consists of:

a) Copy numbers representing actual copies available.
b) Circulation restrictions.
c) Processing Status. (A plus (+) means that the item is being processed onto active reserve status; a minus (-) means that the item is being taken off of active reserve; no symbol indicates that the item is either on active reserve or in storage, depending upon whether there is a current course need.)

2.3.1.4. Order Information: Order information consists of the total number of copies that are on order for a given entry.

2.3.2. Data encoding: The system is designed to allow formal data encoding to occur at different points in the processing cycle, allowing the librarian to:

a. encode an entry after it is completely searched and verified

b. encode an incomplete entry and add additional data at a later time

c. revise information and/or status of an entry already resident in the file.

In each case, formal messages have been designed to facilitate this reporting function.

2.3.2.1. Encoding Entries: The system is designed to accommodate input in a variety of forms. The desired mode, that of direct on-line entry in a real time environment, was not attainable on a sustained level during development and implementation of the system. Therefore, three alternate input systems were developed. They are:

a. encoding on a 029 keypunch for batch submission and processing

b. encoding on a Dura tape typewriter for batch submission and processing.

c. Using an IBM 2741 terminal for on-line data entry and remote submission and batch processing.

There is little doubt that the most efficient and economical method of input is using an on-line terminal. Not only is there an increase in typing speed, but also a significant reduction of input typing errors. Whenever possible, input is done on the 2741 terminal; keypunch and tape-typewriter input is used primarily as a backup at present.

COLUMBIA UNIVERSITY LIBRARIES

RESERVE READING LIST FORM

Instructor:

Campus Address:

Telephone Extension:

Office Hours:

Course (Name and Number):

Expected Enrollment:

Return Completed List by ________________

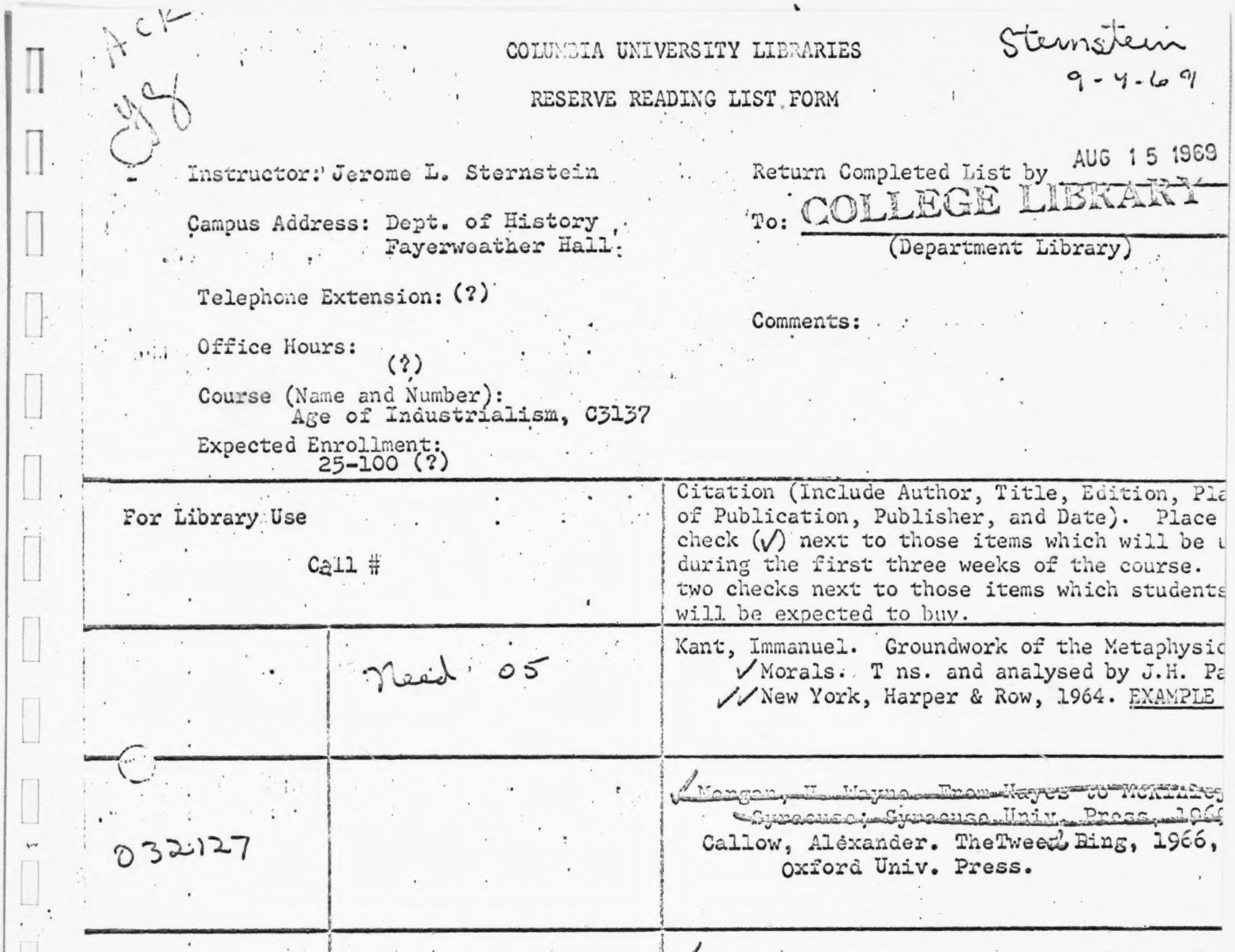
To: ________________
(Department Library)

Comments:

For Library Use	Call #	Citation (Include Author, Title, Edition, Place of Publication, Publisher, and Date). Place one check (✓) next to those items which will be used during the first three weeks of the course. Place two checks next to those items which students will be expected to buy.
		Kant, Immanuel. Groundwork of the Metaphysic of ✓Morals. Trans. and analysed by J.H. Paton. ✓✓New York. Harper & Row, 1964. EXAMPLE ONLY

FIGURE 5A

PROFESSOR RESERVE REQUEST FORM
(FRONT SIDE)



ACK

Sternstein
9-4-69

COLUMBIA UNIVERSITY LIBRARIES

RESERVE READING LIST FORM

Instructor: Jerome L. Sternstein

Campus Address: Dept. of History
Fayerweather Hall

Telephone Extension: (?)

Office Hours:
(?)

Course (Name and Number):
Age of Industrialism, C3137

Expected Enrollment:
25-100 (?)

Return Completed List by AUG 15 1969

To: COLLEGE LIBRARY
(Department Library)

Comments:

For Library Use Call #		Citation (Include Author, Title, Edition, Pla of Publication, Publisher, and Date). Place check (✓) next to those items which will be u during the first three weeks of the course. two checks next to those items which students will be expected to buy.
	Need 05	Kant, Immanuel. Groundwork of the Metaphysic ✓Morals. T ns. and analysed by J.H. Pa ✓✓New York, Harper & Row, 1964. EXAMPLE
032127		✓~~Morgan, H. Wayne. From Hayes to McKinle Syracuse; Syracuse Univ. Press, 196~~ Callow, Alexander. TheTweed Ring, 1966, Oxford Univ. Press.
059632		✓ Kirkland, Edward C. Industry Comes of Business, Labor, and Public Policy, 1860-1897, New York: Holt, Rinehart Winston, 1961
080108		✓ Josephson, Mat thew. The Politicos, 1 1898, (1938) Harcourt, Brace pb.
062855		✓ Kirkland, Dream and Thought in the Bu Community, Quadrangle pb.

R73(269)5M

FIGURE 5B

PROFESSOR RESERVE REQUEST FORM AS COMPLETED BY THE PROFESSOR AND PROCESSED BY THE LIBRARIAN. (THE SIX-DIGIT NUMBERS ARE MASTER RESERVE SEQUENCE NUMBERS.)

Columbia University in the City of New York | *New York, N.Y. 10027*

THE LIBRARIES

INSTRUCTION SHEET FOR COMPLETING

THE RESERVE READING LIST FORM

PLEASE READ THE FOLLOWING INSTRUCTIONS BEFORE COMPLETING THE ATTACHED READING LIST FORM.

1. Please submit a separate list for each course that you will be teaching. Type one title per block. Alphabetize your lists by author. In general, titles are kept on current reserve for one semester only.

2. Provide as complete a citation as possible, following the example given. If a particular edition of a work is necessary, please specify the edition needed, otherwise the library will use the most readily available edition(s) of the work.

3. If possible, request in-print items rather than rare, expensive, or out-of-print items. The library has great difficulty in locating and acquiring out-of-print or costly materials in quantity. If the library is unable to locate any item which you have requested, you will be notified.

4. List only books which students are required to read. Do not list books which are for recommended or supplementary reading only. Please indicate those books which students are expected to buy. The Library will not place these books on reserve in quantity. If possible, indicate those items which will be used during the first three weeks of the course, so that the library can try to have the books available when they are needed.

5. The library should know the anticipated number of students enrolled in order to provide optimum service. If your estimated number should change significantly after you have submitted your list, please notify the library so that it can take proper action.

LISTS ARE PROCESSED IN THE ORDER THEY ARE RECEIVED.

PLEASE RETURN YOUR LIST PROMPTLY.

R73.1(467)2000

FIGURE 6

INSTRUCTION SHEET FOR THE RESERVE REQUEST FORM.

Columbia University in the City of New York | *New York, N.Y. 10027*

THE LIBRARIES
Butler Library

Since catalogs for courses to be given next fall are not available, we have examined the galley proofs for the bulletins of Columbia College, the School of General Studies, and Graduate Faculties. You are included in the list of persons who will be teaching in the fall term.

Would you please fill in the enclosed reserve reading list forms according to the attached instructions? The completed forms plus a copy of your syllabus should be returned to the College Library by August 15, 1969. The earlier the lists are returned to us for processing the more certain you can be that the required items will be on reserve for all semester. Extra forms are available upon request, x3534.

Only material which is required reading for all the students taking the course is placed on reserve. We do not put textbooks nor bound volumes of journals on reserve. We will xerox articles needed for the course. Reserve materials circulate for only two hours during the day and overnight from 3 p.m. until 10 a.m. the following morning.

It is important that you indicate on the forms the expected enrollment or the number of students who registered for the course last fall. Depending on the size of your class, the number of items to be read, and the type of assignment made, it may be more feasible for the books to remain on the open shleves without restrictive two-hour circulation.

Mrs. Herschman or I will be happy to answer any questions you may have about the reserve book operation. You can reach us, Monday through Friday from 8:30 until 5 at x3534, or x4338.

Yours truly,

(Mrs.) Ann M. Wilkinson
College Librarian

AW/jma

FIGURE 7

COVER LETTER TO ACCOMPANY THE INSTRUCTION SHEET AND THE PROFESSOR RESERVE REQUEST FORM.

Date ________

COL BC Other

Book

Copies needed: ____

Copies on current reserve ______

Copies collected COL ______

BC ______

Copies recalled COL ______

BC ______

In Print?

Place ________

Publisher ________

Date ________

Price ________

Request ______

Date requested ________

Received ________

Missing

Note written ________

Periodical article

Copies needed: ______

Copies on current reserve ______

Copies in xerox files ______

Collected

Request Volume ______

Sent to xerox ______

Missing ____

Note written ________

Copy numbers

College

BC

Other

Courses

FIGURE 8A
VERIFICATION FORM (USED TO SEARCH TITLES NEW TO THE MASTER RESERVE FILE)

Date 9-18-69

COL BC Other 6L 506 S125 V.1

Muller-Vollmer, Kurt
Towards a Phemomonological Theory of Literature
1963

Book

Copies needed: ____ 1

Copies on current reserve ______

Copies collected COL ______

BC ______

Copies recalled COL ______

BC ______

In Print?

Place ________

Publisher Humanities

Date ________

Price 6.00

Request ______

Date requested ________

Received ________

Missing

Note written ________

Periodical article

Copies needed: ______

Copies on current reserve ______

Copies in xerox files ______

Collected

Request Volume ______

Sent to xerox ______

Missing ____

Note written ________

Copy numbers

College

BC

Other

Courses Eng G4563x Said

FIGURE 8B
EXAMPLE OF A COMPLETED VERIFICATION FORM

Source documents in the form of Verification Forms, or request forms from professors, are sent to the input typist. The source documents contain all of the information gathered about an entry, together with general input processing instructions. No special pre-editing or coding is required; the typist routinely identifies the types of data and processing needed and supplies the appropriate data code and/or processing function code as part of the keying effort.

2.3.2.2. Entering a Record. (The terms "entry" and "record" are used interchangeably.) An entry as used in the system differs from the normal concept of a bibliographic entry. As the system is designed to maintain control of individual physical volumes; a record is kept of each discreet physical item. On one level, this means discreet listing of all multiple copies. On another level, this means separate entry for each volume of a multi-volume work. Thus, a two-volume work is entered into the reserve file as two entries, one for the first volume and its copies; the second for the second volume and its copies.

```
ENT
AUTH    ADAMS, HENRY
TITL    FORMATIVE YEARS.  VI
DATE    1948
CALL    G 973  AD1231 V1
COPY    01
Q

ENT
AUTH    ADAMS, HENRY
TITL    FORMATIVE YEARS.  V2
DATE    1948
CALL    G 973  AD1231  V2
COPY    1
Q
```

2.3.2.3. Input for File Building. "File Building" is defined as entering a new record into the Master Reserve File. This can be done by entering a name plus any other information that is available. This allows the librarian to use the system as a working area imputing as little or as much information as is available and adding to it over a period of time. The computer coordinates all of these bits of information and processes an entry automatically when sufficient data has been accumulated or reminds the librarian when additional information is required.

Each bit of data is tagged with machine interpretable mnemonics at the time of input typing. A new line is typed for each data element.

EXAMPLE:

```
ENT
AUTH      AARON, DANIEL
TITL      AMERICA IN CRISIS
DATE      1952
CALL      C 973    AA75
COPY      01  02  03  04  06  07  08  09  10
Q
```

In addition to typing data elements and codes, each entry must have a transaction type code, which instructs the computer to do one of several operations. Several transaction codes are identified; these include:

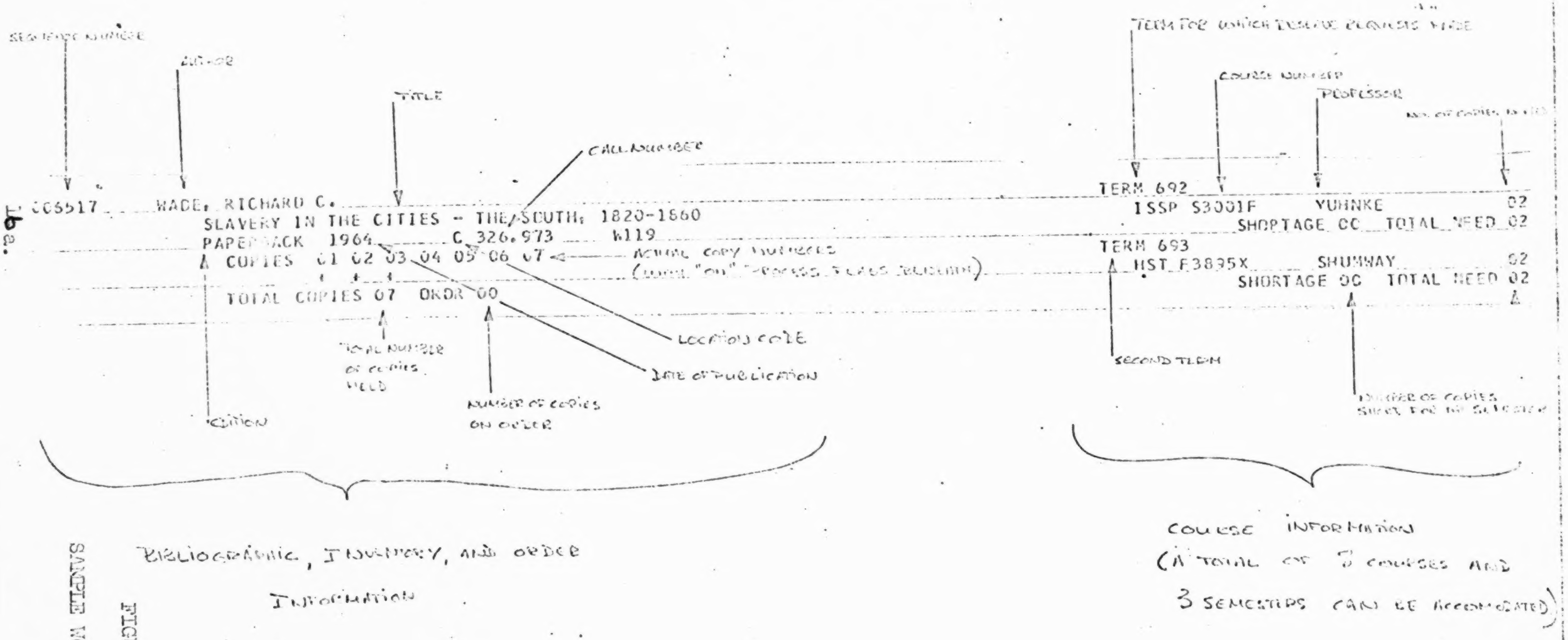
ENT	(to enter a new record)
ADD	(to add course, inventory and order information to a record)
SUB	(to delete course, inventory and order information from a record)
MOD	(to modify bibliographic information in a record)
DEL	(to delete complete record from the file)

(These transactions are discussed in detail in Section 2.3)

In typing an entry, the typist enters the transaction type code first, types the tagged data elements, and terminates the message by typing a "Q".

EXAMPLE:

```
ENT
AUTH      ABIR, MORDECHAI
TITLE     ETHIOPIA - THE AGE OF THE PRINCES
DATE      1968
```

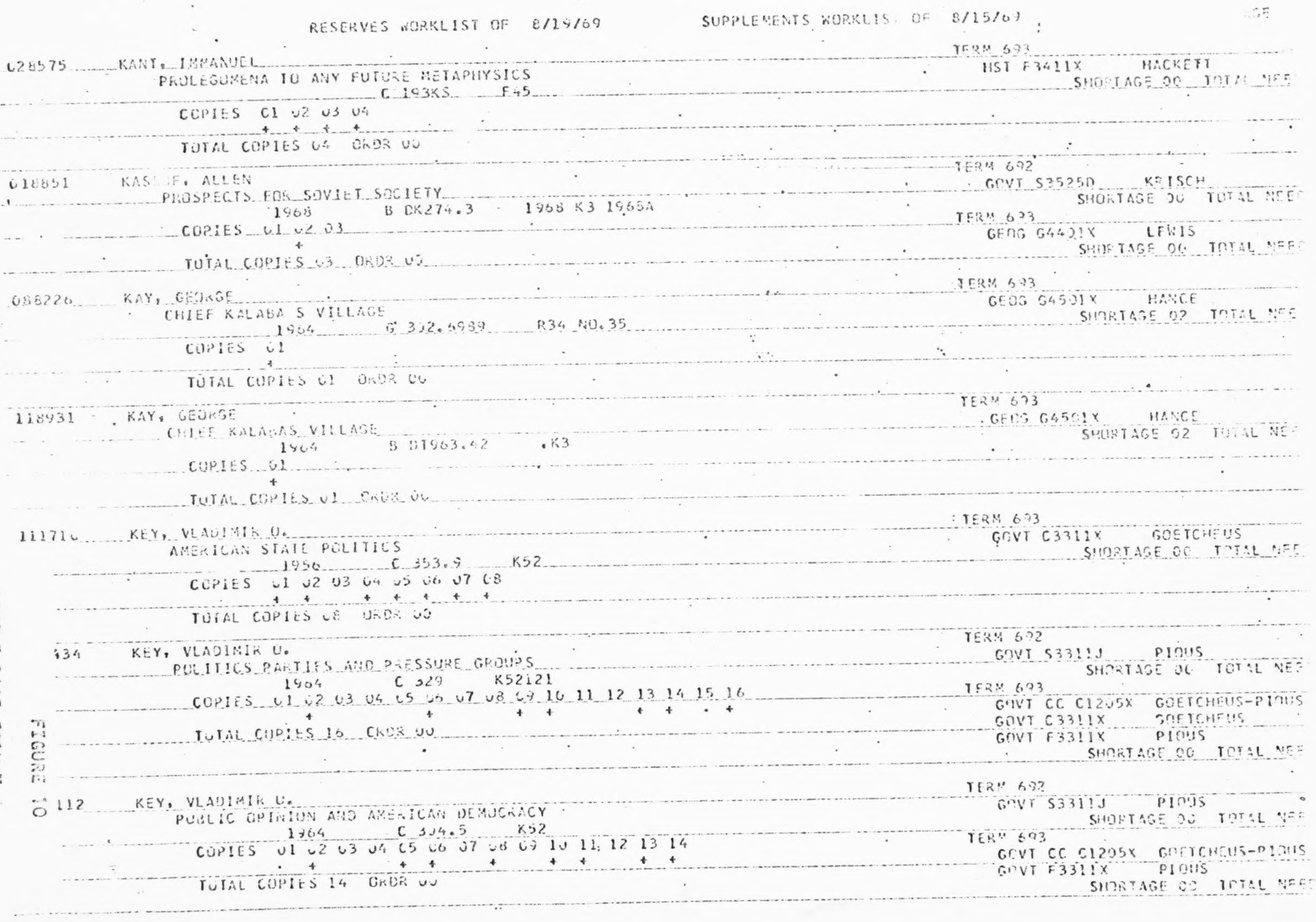


```
C05517     WADE, RICHARD C.                                              TERM 692
        SLAVERY IN THE CITIES - THE SOUTH, 1820-1860                       ISSP S3001F     YUHNKE           02
        PAPERBACK  1964        C 326.973     W119                                      SHORTAGE 00  TOTAL NEED 02
        A COPIES  01 02 03 04 05 06 07                                   TERM 693
                                                                           HST F3895X      SHUMWAY          02
          TOTAL COPIES 07  ORDR 00                                                     SHORTAGE 00  TOTAL NEED 02
```

SEQUENCE NUMBER
AUTHOR
TITLE
CALL NUMBER
ACTUAL COPY NUMBERS
(WORD "ON" PROCESS [illegible])
LOCATION CODE
DATE OF PUBLICATION
TOTAL NUMBER OF COPIES HELD
NUMBER OF COPIES ON ORDER
EDITION
TERM FOR WHICH RESERVE REQUEST MADE
COURSE NUMBER
PROFESSOR
NO. OF COPIES NEEDED
SECOND TERM
NUMBER OF COPIES SHORT FOR THE SEMESTER
BIBLIOGRAPHIC, INVENTORY, AND ORDER INFORMATION
COURSE INFORMATION
(A TOTAL OF 3 COURSES AND 3 SEMESTERS CAN BE ACCOMMODATED)

FIGURE 9

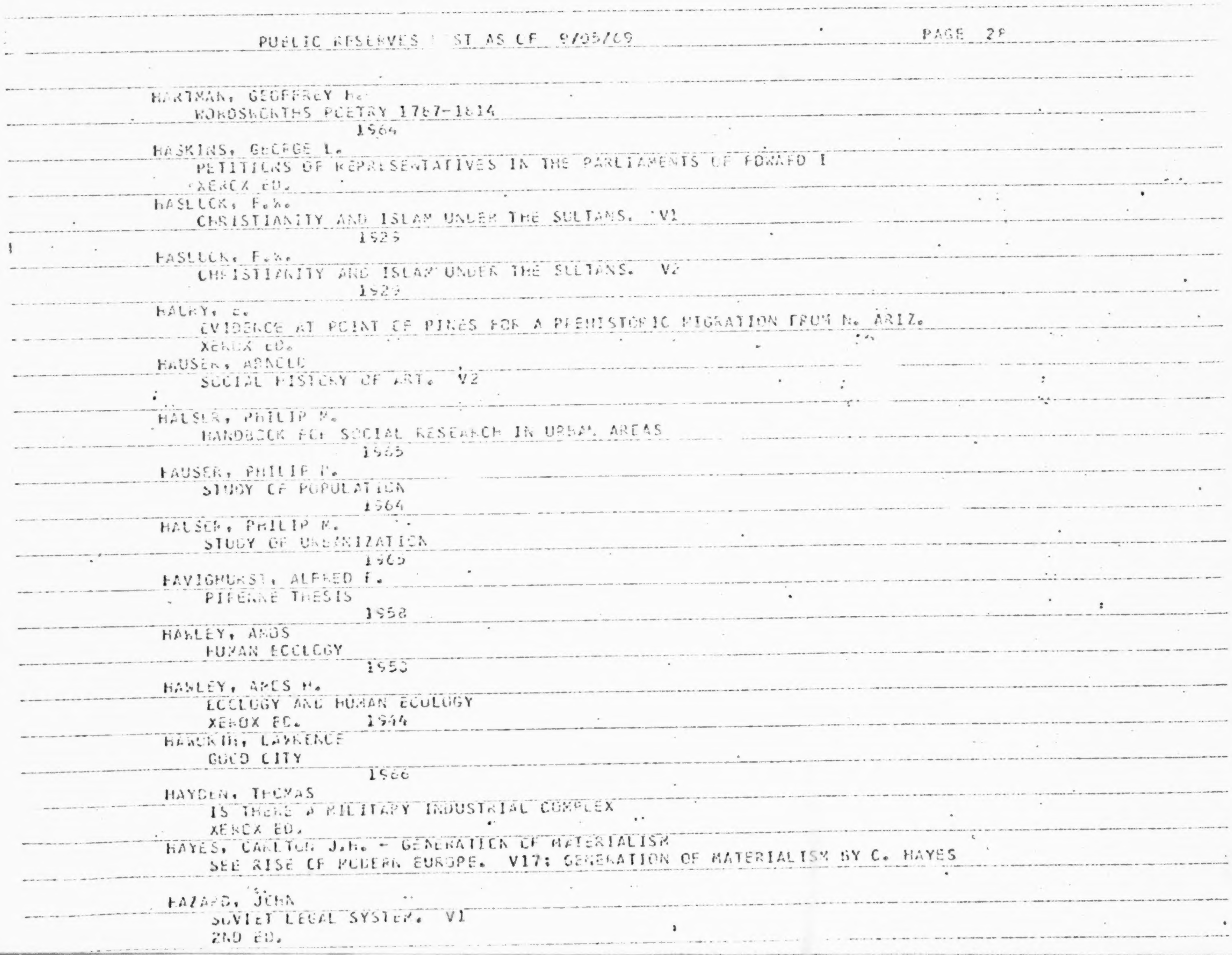
SAMPLE WORKLIST ENTRY



```
                         RESERVES WORKLIST OF  8/19/69          SUPPLEMENTS WORKLIS  OF  8/15/69                      GE
                                                                                  TERM 693
028575     KANT, IMMANUEL                                                            HST F3411X      HACKETT
              PROLEGOMENA TO ANY FUTURE METAPHYSICS                                         SHORTAGE 00  TOTAL NEE
                                    C 193KS     F45
                 COPIES  01 02 03 04
                          +  +  +  +
                 TOTAL COPIES 04  ORDR 00
                                                                                  TERM 692
018851     KASDOF, ALLEN                                                             GOVT S3525D     KRISCH
              PROSPECTS FOR SOVIET SOCIETY                                                  SHORTAGE 00  TOTAL NEED
                            1968       B DK274.3    1968 K3 1965A                 TERM 693
                 COPIES  01 02 03                                                    GEOG G4401X     LEWIS
                            +                                                               SHORTAGE 00  TOTAL NEED
                 TOTAL COPIES 03  ORDR 00
                                                                                  TERM 693
086226     KAY, GEORGE                                                               GEOG G4501X     HANCE
              CHIEF KALABA S VILLAGE                                                        SHORTAGE 02  TOTAL NEE
                            1964       G 392.6989      R34 NO.35
                 COPIES  01
                          +
                 TOTAL COPIES 01  ORDR 00
                                                                                  TERM 693
118931     KAY, GEORGE                                                               GEOG G4501X     HANCE
              CHIEF KALABAS VILLAGE                                                         SHORTAGE 02  TOTAL NE
                            1964       B DT963.42      .K3
                 COPIES  01
                          +
                 TOTAL COPIES 01  ORDR 00
                                                                                  TERM 693
111716     KEY, VLADIMIR O.                                                          GOVT C3311X     GOETCHEUS
              AMERICAN STATE POLITICS                                                       SHORTAGE 00  TOTAL NEE
                            1956       C 353.9     K52
                 COPIES  01 02 03 04 05 06 07 08
                          +  +     +  +  +  +  +
                 TOTAL COPIES 08  ORDR 00
                                                                                  TERM 692
434        KEY, VLADIMIR O.                                                          GOVT S3311J     PIOUS
              POLITICS PARTIES AND PRESSURE GROUPS                                          SHORTAGE 00  TOTAL NEE
                            1964       C 329       K52121                         TERM 693
                 COPIES  01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16             GOVT CC C1205X  GOETCHEUS-PIOUS
                             +           +           +  +           +  +  .  +       GOVT C3311X     GOETCHEUS
                 TOTAL COPIES 16  ORDR 00                                            GOVT F3311X     PIOUS
                                                                                            SHORTAGE 00  TOTAL NEE
                                                                                  TERM 692
112        KEY, VLADIMIR O.                                                          GOVT S3311J     PIOUS
              PUBLIC OPINION AND AMERICAN DEMOCRACY                                         SHORTAGE 00  TOTAL NEE
                            1964       C 304.5     K52                            TERM 693
                 COPIES  01 02 03 04 05 06 07 08 09 10 11 12 13 14                   GOVT CC C1205X  GOETCHEUS-PIOUS
                          .  +        +  +     +     +  +     +  +                   GOVT F3311X     PIOUS
                 TOTAL COPIES 14  ORDR 00                                                   SHORTAGE 00  TOTAL NEED
```

FIGURE 10

SAMPLE PAGE FROM THE
MASTER WORKLIST.



```
             PUBLIC RESERVES LIST AS OF 9/05/69                          PAGE 28

          HARTMAN, GEOFFREY H.
              WORDSWORTHS POETRY 1787-1814
                              1964
          HASKINS, GEORGE L.
              PETITIONS OF REPRESENTATIVES IN THE PARLIAMENTS OF EDWARD I
              XEROX ED.
          HASLUCK, F.W.
              CHRISTIANITY AND ISLAM UNDER THE SULTANS. V1
                              1929
          HASLUCK, F.W.
              CHRISTIANITY AND ISLAM UNDER THE SULTANS.  V2
                              1929
          HAURY, E.
              EVIDENCE AT POINT OF PINES FOR A PREHISTORIC MIGRATION FROM N. ARIZ.
              XEROX ED.
          HAUSER, ARNOLD
              SOCIAL HISTORY OF ART.  V2

          HAUSER, PHILIP M.
              HANDBOOK FOR SOCIAL RESEARCH IN URBAN AREAS
                              1965
          HAUSER, PHILIP M.
              STUDY OF POPULATION
                              1964
          HAUSER, PHILIP M.
              STUDY OF URBANIZATION
                              1965
          HAVIGHURST, ALFRED F.
              PIRENNE THESIS
                              1958
          HAWLEY, AMOS
              HUMAN ECOLOGY
                              1950
          HAWLEY, AMOS H.
              ECOLOGY AND HUMAN ECOLOGY
              XEROX ED.       1944
          HAWORTH, LAWRENCE
              GOOD CITY
                              1966
          HAYDEN, THOMAS
              IS THERE A MILITARY INDUSTRIAL COMPLEX
              XEROX ED.
          HAYES, CARLTON J.H. - GENERATION OF MATERIALISM
              SEE RISE OF MODERN EUROPE.  V17: GENERATION OF MATERIALISM BY C. HAYES

          HAZARD, JOHN
              SOVIET LEGAL SYSTEM.  V1
              2ND ED.
```

FIGURE 11

SAMPLE PAGE FROM THE
PUBLIC REFERENCE LIST.

```
CALL    C DT384  S.A55  1968
COPY    01  02
ORDR    03
PROF    WRIGHT
CRSE    HST  G4920X
TERM    693
NEED    05
Q
```

2.3.2.4. Update Input. Records in the file are updated in several ways, using the various processing functions. The most frequently used processing function is the ADD function code. The steps for adding information are as follows:

1. Type the function code (in this case ADD).
2. Type the entry sequence number (a unique code assigned by the computer; see section 2.3.1.2. below for a detailed description).
3. Type the data element tag immediately followed by the data to be added.
4. Type a "Q".

Several data elements can be added at one time. In the following example inventory and order information are being added to an entry. In the following example, PROFessor, CouRSE, TERM, NEED, and ORDeR information are being added.

```
ADD     002457
PROF    LUBITZ
CRSE    ECON  C1501X
TERM    693
NEED    05
ORDR    05
Q
```

In a similar fashion, information can be DELeted from an entry by using the SUBtract function.

```
SUB     002457
PROF    LUBITZ
CRSE    ECON  C1501X
TERM    693
NEED    05
ORDR    05
Q
```

In the above example PROFessor, CouRSE, TERM, NEED and ORDeR information will be deleted from the entry.

Using the MODify function, information within an entry is changed. In this example, the author field is modified.

```
MOD     023285
AUTH    ABERNATHY, THOMAS P.
Q
```

In this example both author and title are modified.

```
MOD     005438
AUTH    ABIR, MORDECAI
TITL    ETHIOPIA - THE AGE OF THE PRINCES
Q
```

Using the DELete function, an entry can be completely deleted from the file. In this example, the entire entry in the Master Reserve File will be erased.

```
DEL     023285
Q
```

2.3.2.5. File contents. The main reserve file is stored on an IBM 2311 Disc Pack in sequence number order. As new entries are input, they are added to the end of the file and assigned a unique sequence number.

As outlined above, four types of information are manually input into the system: bibliographic which remains permanently resident or until DELeted; inventory which remains relatively permanent but may be SUBtracted or ADDed to; course information which is retained for three semesters and then fed to an historical file; and order information which remains only as long as an order is outstanding.

Additional information is added automatically by the program to a record at different times to indicate status change and certain other conditions. These include:

1. Sequence number. As each new entry is added a unique 6 digit sequence number is added to identify a record.

2. Processing status. Plus (+) and minus (-) symbols are added to indicate whether an item is being processed onto or off of reserve status. (A machine readable inventory card is produced each time a status change occurs; see 2.4.1.3. below for a description of these products.)

3. Total need. Individual course needs for a semester are added together to give the total number of copies needed for a particular semester.

4. Total inventory. The total number of copies included in the inventory field is calculated and printed as the total number of copies available.

5. Copy shortage. All course needs for a title for a particular semester are added together then subtracted from available inventory to compute Copy Shortage.

2.4. Processing Functions

The reserve computer programs are designed and written to accept data and instructions at various points in the processing cycle and automatically initiate action in the form of worklists, inventory processing cards, and public reference lists. The array of processing functions included are few in number and relatively simple to understand and use. They can be used singly or in combination providing the librarian with an extremely sophisticated combination of processing controls.

In the following section, the computer processing functions included in the system are described and examples of how they are used are given.

2.4.1. ENTer. The enter function is used to insert a new entry into the computer file. The computer will take one of several actions depending on the amount of information entered.

2.4.1.1. Establishing a record. The minimum amounts of information that may be entered to create a new record is author.

2.4.1.2. Sequence number. Every new record entered is assigned a unique, six digit sequence number by the computer. This number reflects the record's location in the computer file and is printed out in the librarian's worklist. All subsequent actions affecting a record must include this sequence number for reference purposes.

2.4.1.3. ON Inventory Cards. If course information is entered for a current semester the computer will calculate the total number of copies needed and compare this figure with the available inventory. If no inventory exists, warning messages in the form of punched cards are produced. ON cards are produced equal to the number of copies needed. A warning message is produced if the number of available copies is less than the copies listed as needed.

2.4.2. ADD. The ADD function is used to add information to a record. The ADD function can be used at any time to add information to the following data fields.

2.4.2.1. Course Data Field. Adding course information will cause the computer to increase the total number of copies needed and to produce additional ON Inventory Cards and/or warning messages.

2.4.2.2. Inventory Data Field. As new copies are added, the computer will recalculate shortages and need figures.

2.4.3. SUBtract. The SUBtract function is used to delete information from a record. The SUBtract function can be used at any time to delete information from the following data fields:

2.4.3.1. Course Data Field. Deleting a course will cause the computer to recalculate the number of copies needed, adjusting the shortage figure if necessary.

2.4.3.2. Inventory Data Field. Deleting copies from the inventory field will cause the computer to recalculate the total number of copies available and adjust the shortage figure if necessary.

2.4.4. MODify. The MODify function is used to change information in the bibliographic data field. In order to modify any part of the bibliographic data field, the entire data element is input, replacing the information already in the record.

2.4.5. DELete. The DELete function is used to cancel an entire record from the computer file.

2.4.6. CHK. The CHecK function is used to correct a status symbol for any copy number in the inventory data field.

2.4.7. ON. The ON function is initiated by the annotated ON inventory card. As ON inventory cards are returned to the computer, the plus (+) status code is erased from the appropriate copy number in the inventory data field.

2.4.8. OFF. The OFF function is initiated by the manually annotated OFF inventory cards. As OFF inventory cards are returned to the computer, the minus (-) status code is erased from the appropriate copy number in the inventory data field.

(ON inventory cards are produced by the computer as course needs are entered into the file. This occurs at any time with processing peaks occuring immediately before or just after the beginning of a semester. OFF cards are produced as part of the Term End Program once a semester.)

2.5. Output.

The computer is programmed to produce a variety of lists and machine readable records on demand. The Master Worklist, for example, can be produced on a regular schedule (e.g., daily, weekly, monthly, or whenever it is needed). During the interval between Master Worklist runs, Cummulative Supplements can be produced, again when needed. Other lists, such as course lists, are produced on-demand. Machine readable ON cards are produced automatically as semester status changes, while machine readable OFF cards are produced on-demand. This flexibility has been incorporated into the system to allow the librarian to exert as much (or as little) control over processing cycles as is necessary.

2.5.1. Master Worklist. The Master Worklist is a complete listing of all entries in the master reserves file, and may be produced in its entirety or as a cumulative supplement each time the master file is updated. Figure 9 is a sample page of this list and should be consulted when reading the following discussion of these elements. Figure 10 represents a typical page from a Master Worklist. The Master Worklist is the master guide to the reserve collection, and is referred to for many reasons. Its primary use is for staff reference and in processing new reserve requests from professors.

Bibliographic and inventory information appear on the left side of the page, with author and sequence number offset in a hanging indention to facilitate scanning of entries. Course information appears on the right side of the page. All data elements are included in full.

2.5.1.1. Bibliographic Information. Sequence number and author appear on the first line of the entry; title is printed on the second line; and edition, date of publication, and call number appear on the third.

2.5.1.2. Inventory and Order Information. Individual copy numbers appear immediately below bibliographic information. The maximum number of copies allowable is 99.

Status symbols, or processing flags, appear immediately below the copy numbers to which they apply. (If there are no flags for a line, the output is condensed and no blank line is left below a copy number line.)

The total number of copies in inventory and the number of copies on order is printed on the last line of the inventory field.

2.5.1.3. Course Information. Course information for the current and two future semesters can be included for any one entry. Semesters are identified as three digit numbers, the first two digits representing year and the third representing semester within that year.(i.e., 1 = Spring, 2 = Summer session, and 3 = Fall). A total of eight (8) different courses are allowed among these three semesters. Each course is printed on one line under the appropriate semester and includes course number, professor name, and number of copies needed. On a separate line for each semester, the total need and copy shortage is printed. The computer generates these summary figures each time the course field is updated. If there is no course listed for a semester, all data for that term are suppressed.

2.5.2. Supplementary Worklist. As mentioned above, the Worklist can be produced in two forms, either as a Master List or as a Supplement. Which of the two lists is produced is decided before a computer run is submitted. The Supplementary List is cumulative, containing entries that have been entered or referenced since the last Master Worklist run. At any one time, no more than two lists need be consulted to ascertain the status of an entry in the file. All entries in the Supplementary List are incorporated in the Master Worklist each time a Master run is done.

During peak processing periods, Master Worklist runs can be submitted as often as needed. Experience has indicated that weekly runs with Supplementary runs on each of the intervening weekdays is adequate. During slack periods Master and Supplementary runs may be varied as wanted. Experience has indicated that monthly master runs with weekly Supplementary runs is adequate.

2.5.3. Public Reference List.(Figure 11). The Public Reference List is produced by the main processing program on the same schedule as a Master or Supplement Work List. The Public Reference List is an extract of the Worklist and contains a three-line entry (author, title, edition and date) for those entries on active reserve. No other entries in the reserve file appear in the Public List Reference.

The Public Reference List is alphabetically arranged by author, and subarranged by title. It can be printed in the form of a Master and Cumulative Supplement on the same basis as the Worklist. The Public List is produced in multiple copies and is used for circulation and reference purposes.

2.5.4. Error List (Figure 12). An error list is produced for both Master and Supplementary runs. The Error list includes input typing errors (i.e., format errors, tagging errors), sequence number errors (the automatically generated sequence number contains a check digit), and inventory card matching errors (i.e., an ON card is submitted for a non-esistent copy number). In addition, warning messages are included.

Processing statistics for a complete run are printed at the end of the error list. These include the number of records referenced, the number of ON cards produced, the number of Warning cards produced, and the number of transactions for each of the different processing functions submitted.

2.5.5 Sequence List and Supplement. (Figure 13). A master Sequence List in numerical order is produced once or twice a year, and contains, for each entry in the master reserve file, the sequence number, a portion of the author field (32 characters), a portion of the title (5 characters). The list serves as a numerical index to the Master File and is used for error correction.

A Sequence List supplement, in the same basic format as the Master Sequence List, is produced with each processing run and contains all new entries entered into the file. Supplements are bound with the Master Sequence List.

2.5.6. Professor List. (Figure 14). The Professor List is produced on demand by a special program several times a semester and consists of a series of separate lists by professor's name and course number listing all titles placed on reserve for the current semester. Each entry contains all bibliographic data included in the Master File (except location). Entries in each list are divided into two categories, those which are actually on active reserve and those which are "in process".

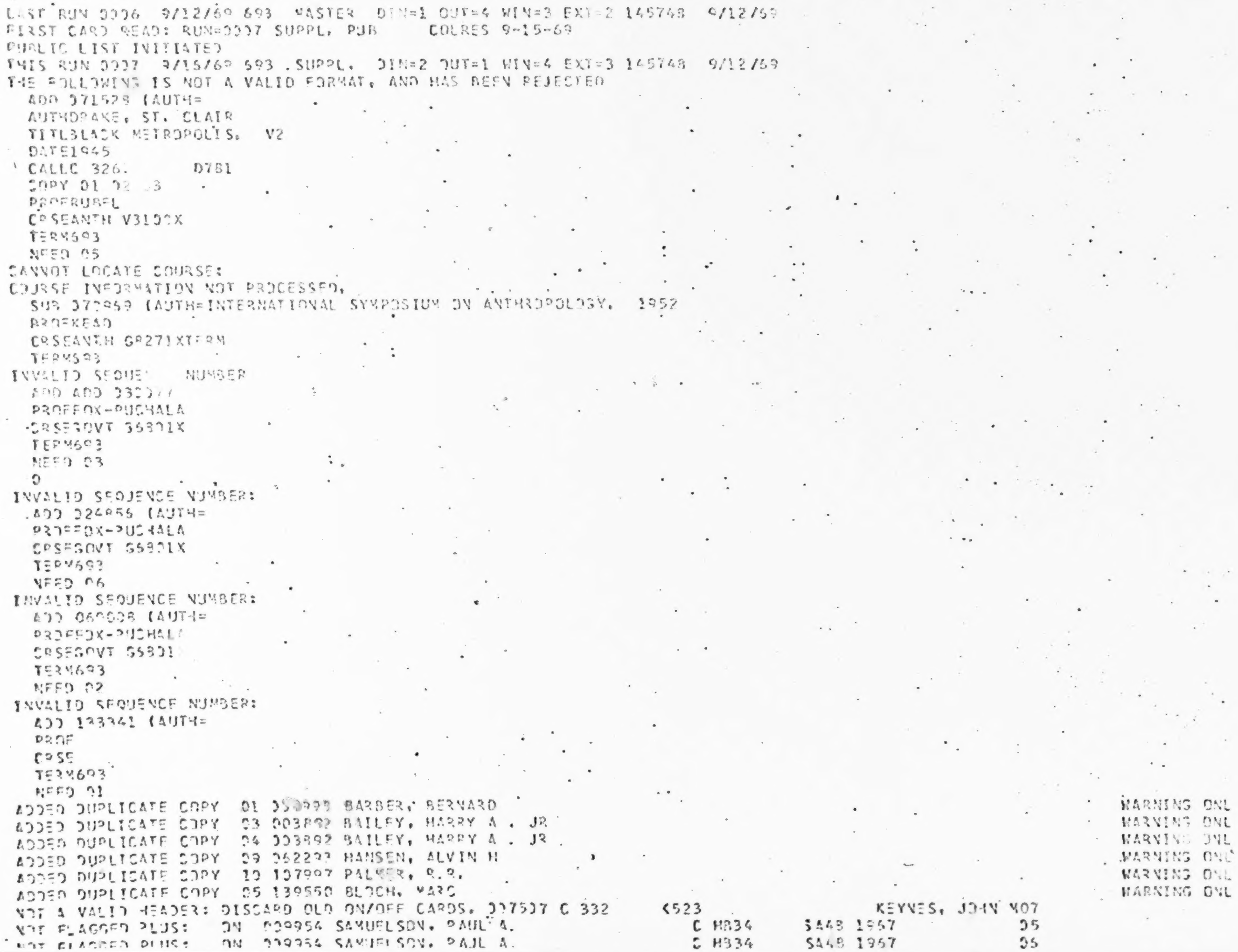
Copies of the Professor List are put out for reference and are used by library staff and public to identify titles on reserve for a particular course. In addition, individual course lists are sent to the respective professors.

2.5.7. Inventory Check List. During the same run which produces the Professor List, an Inventory Check List is produced. It is arranged alphabetically and contains complete bibliographic information for entries which have an active course need (that is, titles which have been requested by a professor for reserve for the current semester) but for which no copies are on active reserve or on order. The list is used as a reminder to the librarian of entries that may need follow-up action.

2.5.8. "ON" Processing Cards (Figure 15). "ON" processing cards in the form of machine readable punched cards are produced by the main processing program during both master and supplementary runs whenever a new course need is ENTered or ADDed for an entry. As ON processing cards are produced a plus (+) status symbol is added to each copy number of the entry in the Reserve File. Data on these cards include sequence number, partial author and call number (or title, if the call number is not used). Space is provided for manually keying a two-digit copy number. ON cards are produced for as many copies as the need indicates, up to the total number of copies in the inventory for that entry.

ON cards are used to collect physical volumes from various locations and as a unit searching record for copies that cannot be located. When a copy is found, the copy number is written on the face of the card, and returned to the input staff where copy number is keypunched into the card. The ON card is then returned to the computer, causing the ON processing flag to be deleted from that copy number in the file, thus indicating that that copy is now on active reserve.

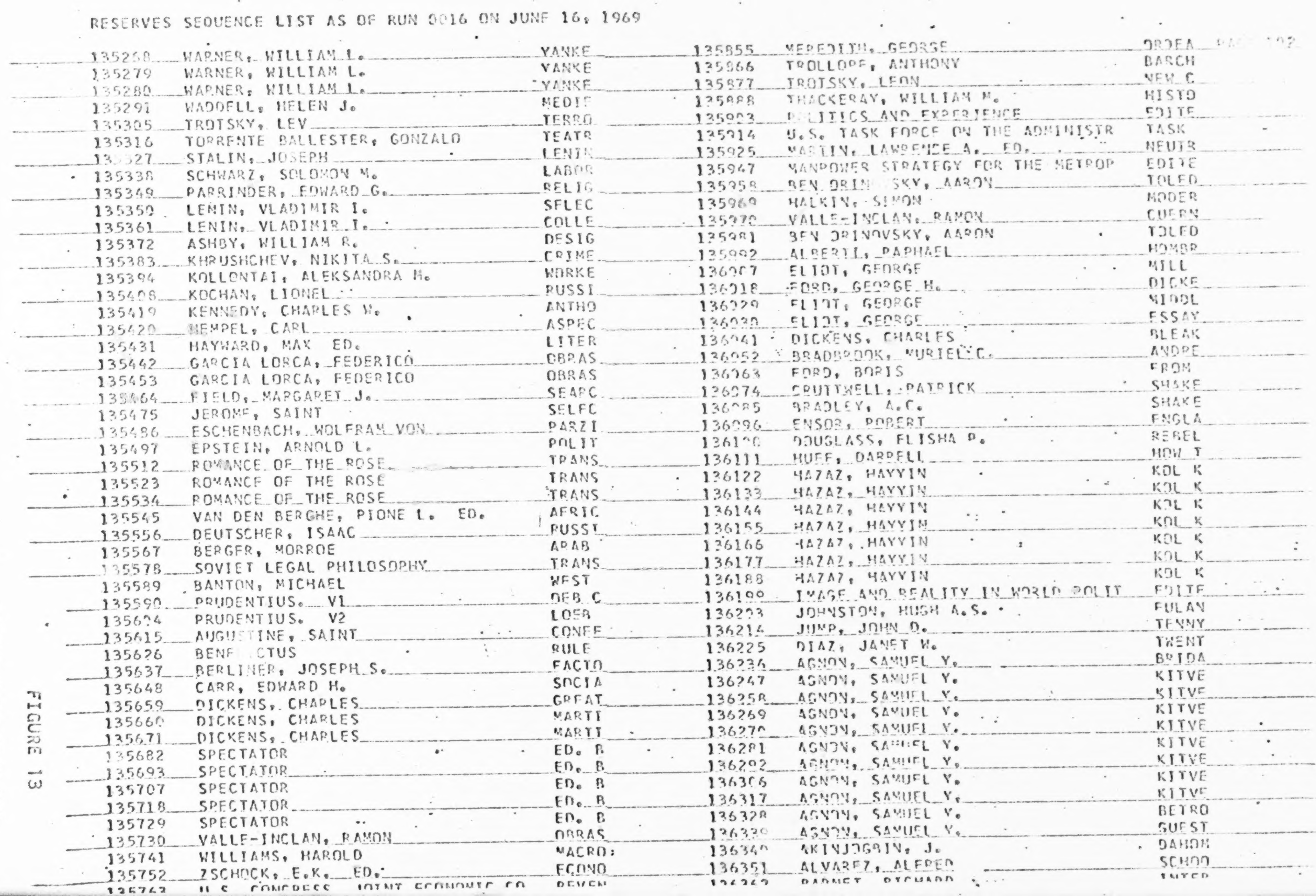
2.5.9. Warning Message Cards (See Figure 16). Certain warning messages relating to the processing of copies onto reserve are produced as punched cards instead of being printed on the error list. These messages are produced when a possible



```
LAST RUN 0006  9/12/69 693  MASTER  DIN=1 OUT=4 WIN=3 EXT=2 145748  9/12/69
FIRST CARD READ: RUN=0007 SUPPL, PUB      COLRES 9-15-69
PUBLIC LIST INITIATED
THIS RUN 0007  9/15/69 693 .SUPPL.  DIN=2 OUT=1 WIN=4 EXT=3 145748  9/12/69
THE FOLLOWING IS NOT A VALID FORMAT, AND HAS BEEN REJECTED
  ADD 071528 (AUTH=
  AUTHDRAKE, ST. CLAIR
  TITLBLACK METROPOLIS.  V2
  DATE1945
  CALLC 326.       D781
  COPY 01 02 03
  PROFRUBEL
  CRSEANTH V3100X
  TERM693
  NEED 05
CANNOT LOCATE COURSE:
COURSE INFORMATION NOT PROCESSED,
  SUB 072969 (AUTH=INTERNATIONAL SYMPOSIUM ON ANTHROPOLOGY,  1952
  PROFKEAD
  CRSEANTH G8271XTERM
  TERM693
INVALID SEQUE    NUMBER
  ADD ADD 030077
  PROFFOX-PUCHALA
  CRSEGOVT 56801X
  TERM693
  NEED 03
  0
INVALID SEQUENCE NUMBER:
 .ADD 024856 (AUTH=
  PROFFOX-PUCHALA
  CRSEGOVT 56801X
  TERM693
  NEED 06
INVALID SEQUENCE NUMBER:
  ADD 060008 (AUTH=
  PROFFOX-PUCHALA
  CRSEGOVT 56801
  TERM693
  NEED 02
INVALID SEQUENCE NUMBER:
  ADD 133341 (AUTH=
  PROF
  CRSE
  TERM693
  NEED 01
ADDED DUPLICATE COPY  01 050998 BARBER, BERNARD                                                      WARNING ONL
ADDED DUPLICATE COPY  03 003892 BAILEY, HARRY A . JR                                                 WARNING ONL
ADDED DUPLICATE COPY  04 003892 BAILEY, HARRY A . JR .                                               WARNING ONL
ADDED DUPLICATE COPY  09 062233 HANSEN, ALVIN H                                                      WARNING ONL
ADDED DUPLICATE COPY  10 107997 PALMER, R.R.                                                         WARNING ONL
ADDED DUPLICATE COPY  05 139550 BLOCH, MARC                                                          WARNING ONL
NOT A VALID HEADER: DISCARD OLD ON/OFF CARDS. 007507 C 332    <523               KEYNES, JOHN M07
NOT FLAGGED PLUS:    ON  039954 SAMUELSON, PAUL A.                  C HB34     SA48 1967         05
NOT FLAGGED PLUS:    ON  039954 SAMUELSON, PAUL A.                  C HB34     SA48 1967         05
```

FIGURE 12

SAMPLE PAGE FROM THE ERROR LIST.

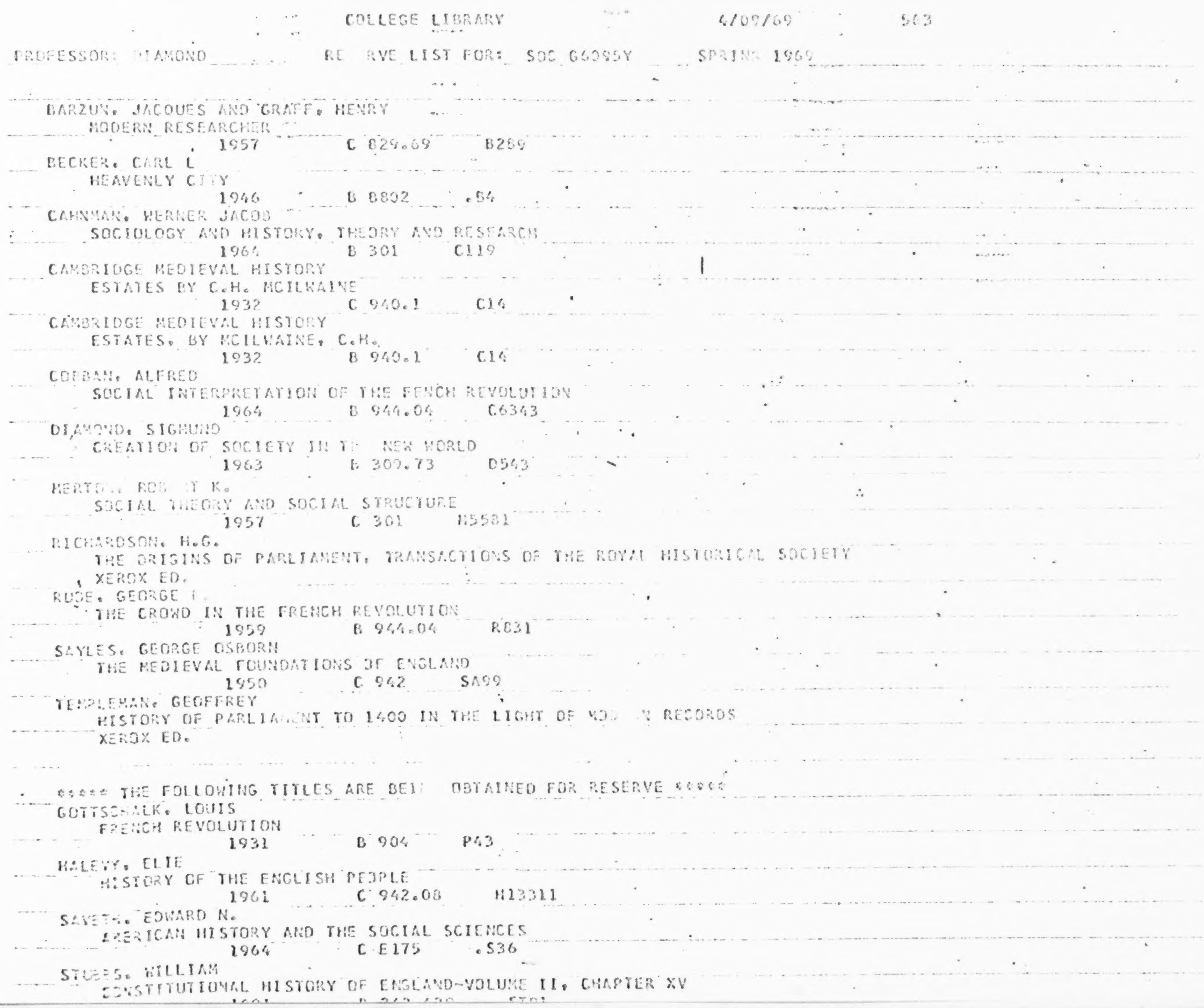


```
RESERVES SEQUENCE LIST AS OF RUN 0016 ON JUNE 16, 1969

 135268  WARNER, WILLIAM L.               YANKE      135855  MEREDITH, GEORGE                 ORDEA  PAGE 102
 135279  WARNER, WILLIAM L.               YANKE      135866  TROLLOPE, ANTHONY                BARCH
 135280  WARNER, WILLIAM L.               YANKE      135877  TROTSKY, LEON                    NEW C
 135291  WADDELL, HELEN J.                MEDIE      135888  THACKERAY, WILLIAM M.            HISTO
 135305  TROTSKY, LEV                     TERRO      135903  POLITICS AND EXPERIENCE          EDITE
 135316  TORRENTE BALLESTER, GONZALO      TEATR      135914  U.S. TASK FORCE ON THE ADMINISTR TASK
 135327  STALIN, JOSEPH                   LENIN      135925  MARTIN, LAWRENCE A.  ED.         NEUTR
 135338  SCHWARZ, SOLOMON M.              LABOR      135947  MANPOWER STRATEGY FOR THE METROP EDITE
 135349  PARRINDER, EDWARD G.             RELIG      135958  BEN ORIN SKY, AARON              TOLED
 135350  LENIN, VLADIMIR I.               SELEC      135969  HALKIN, SIMON                    MODER
 135361  LENIN, VLADIMIR I.               COLLE      135970  VALLE-INCLAN, RAMON              CUERN
 135372  ASHBY, WILLIAM R.                DESIG      135981  BEN ORINOVSKY, AARON             TOLED
 135383  KHRUSHCHEV, NIKITA S.            CRIME      135992  ALBERTI, RAPHAEL                 HOMBR
 135394  KOLLONTAI, ALEKSANDRA M.         WORKE      136007  ELIOT, GEORGE                    MILL
 135408  KOCHAN, LIONEL                   RUSSI      136018  FORD, GEORGE H.                  DICKE
 135419  KENNEDY, CHARLES W.              ANTHO      136029  ELIOT, GEORGE                    MIDDL
 135420  HEMPEL, CARL                     ASPEC      136030  ELIOT, GEORGE                    ESSAY
 135431  HAYWARD, MAX  ED.                LITER      136041  DICKENS, CHARLES                 BLEAK
 135442  GARCIA LORCA, FEDERICO           OBRAS      136052  BRADBROOK, MURIEL C.             ANDRE
 135453  GARCIA LORCA, FEDERICO           OBRAS      136063  FORD, BORIS                      FROM
 135464  FIELD, MARGARET J.               SEARC      136074  CRUTTWELL, PATRICK               SHAKE
 135475  JEROME, SAINT                    SELEC      136085  BRADLEY, A.C.                    SHAKE
 135486  ESCHENBACH, WOLFRAM VON          PARZI      136096  ENSOR, ROBERT                    ENGLA
 135497  EPSTEIN, ARNOLD L.               POLIT      136100  DOUGLASS, ELISHA P.              REBEL
 135512  ROMANCE OF THE ROSE              TRANS      136111  HUFF, DARRELL                    HOW T
 135523  ROMANCE OF THE ROSE              TRANS      136122  HAZAZ, HAYYIN                    KOL K
 135534  ROMANCE OF THE ROSE              TRANS      136133  HAZAZ, HAYYIN                    KOL K
 135545  VAN DEN BERGHE, PIONE L.  ED.    AFRIC      136144  HAZAZ, HAYYIN                    KOL K
 135556  DEUTSCHER, ISAAC                 RUSSI      136155  HAZAZ, HAYYIN                    KOL K
 135567  BERGER, MORROE                   ARAB       136166  HAZAZ, HAYYIN                    KOL K
 135578  SOVIET LEGAL PHILOSOPHY          TRANS      136177  HAZAZ, HAYYIN                    KOL K
 135589  BANTON, MICHAEL                  WEST       136188  HAZAZ, HAYYIN                    KOL K
 135590  PRUDENTIUS.  V1                  OEB C      136190  IMAGE AND REALITY IN WORLD POLIT EDITE
 135604  PRUDENTIUS.  V2                  LOEB       136203  JOHNSTON, HUGH A.S.              FULAN
 135615  AUGUSTINE, SAINT                 CONFE      136214  JUMP, JOHN D.                    TENNY
 135626  BENE  CTUS                       RULE       136225  DIAZ, JANET W.                   TWENT
 135637  BERLINER, JOSEPH S.              FACTO      136236  AGNON, SAMUEL Y.                 BRIDA
 135648  CARR, EDWARD H.                  SOCIA      136247  AGNON, SAMUEL Y.                 KITVE
 135659  DICKENS, CHARLES                 GREAT      136258  AGNON, SAMUEL Y.                 KITVE
 135660  DICKENS, CHARLES                 MARTI      136269  AGNON, SAMUEL Y.                 KITVE
 135671  DICKENS, CHARLES                 MARTI      136270  AGNON, SAMUEL Y.                 KITVE
 135682  SPECTATOR                        ED. B      136281  AGNON, SAMUEL Y.                 KITVE
 135693  SPECTATOR                        ED. B      136292  AGNON, SAMUEL Y.                 KITVE
 135707  SPECTATOR                        ED. B      136306  AGNON, SAMUEL Y.                 KITVE
 135718  SPECTATOR                        ED. B      136317  AGNON, SAMUEL Y.                 KITVE
 135729  SPECTATOR                        ED. B      136328  AGNON, SAMUEL Y.                 BETRO
 135730  VALLE-INCLAN, RAMON              OBRAS      136330  AGNON, SAMUEL Y.                 GUEST
 135741  WILLIAMS, HAROLD                 MACRO:     136340  AKINJOGBIN, J.                   DAHOM
 135752  ZSCHOCK, E.K.  ED.               ECONO      136351  ALVAREZ, ALFRED                  SCHOO
 135763  U.S. CONGRESS. JOINT ECONOMIC CO REVEN      136362  BARNET, RICHARD                  INTER
```

FIGURE 13

SAMPLE PAGE FROM THE
SEQUENCE NUMBER LIST.



```
                   COLLEGE LIBRARY                          4/09/69          563

PROFESSOR: DIAMOND           RESERVE LIST FOR: SOC G6095Y        SPRING 1969

   BARZUN. JACQUES AND GRAFF. HENRY
        MODERN RESEARCHER
                   1957          C 829.69       B289
   BECKER. CARL L
        HEAVENLY CITY
                   1946          B B802         .B4
   CAHNMAN. WERNER JACOB
        SOCIOLOGY AND HISTORY. THEORY AND RESEARCH
                   1964          B 301        C119
   CAMBRIDGE MEDIEVAL HISTORY
        ESTATES BY C.H. MCILWAINE
                   1932          C 940.1        C14
   CAMBRIDGE MEDIEVAL HISTORY
        ESTATES. BY MCILWAINE. C.H.
                   1932          B 940.1        C14
   COBBAN. ALFRED
        SOCIAL INTERPRETATION OF THE FENCH REVOLUTION
                   1964          B 944.04       C6343
   DIAMOND. SIGMUND
        CREATION OF SOCIETY IN THE NEW WORLD
                   1963          B 309.73       D543
   MERTON. ROBERT K.
        SOCIAL THEORY AND SOCIAL STRUCTURE
                   1957          C 301        M5581
   RICHARDSON. H.G.
        THE ORIGINS OF PARLIAMENT. TRANSACTIONS OF THE ROYAL HISTORICAL SOCIETY
      , XEROX ED.
   RUDE. GEORGE
        THE CROWD IN THE FRENCH REVOLUTION
                   1959          B 944.04       R831
   SAYLES. GEORGE OSBORN
        THE MEDIEVAL FOUNDATIONS OF ENGLAND
                   1950          C 942        SA99
   TEMPLEMAN. GEOFFREY
        HISTORY OF PARLIAMENT TO 1400 IN THE LIGHT OF MODERN RECORDS
        XEROX ED.

   ***** THE FOLLOWING TITLES ARE BEING OBTAINED FOR RESERVE *****
   GOTTSCHALK. LOUIS
        FRENCH REVOLUTION
                   1931          B 904        P43
   HALEVY. ELIE
        HISTORY OF THE ENGLISH PEOPLE
                   1961          C 942.08       H13311
   SAVETH. EDWARD N.
        AMERICAN HISTORY AND THE SOCIAL SCIENCES
                   1964          C E175       .S36
   STUBBS. WILLIAM
        CONSTITUTIONAL HISTORY OF ENGLAND-VOLUME II. CHAPTER XV
```

FIGURE 14

SAMPLE PROFESSOR LIST:
TITLES ON RESERVE FOR
ONE COURSE.

copy shortage may exist, when there are outstanding OFF cards for an entry which has an additional need, or when the same course is ADDed twice. These cards are used for manual processing only and are not resubmitted to the computer.

2.5.10. "OFF"Processing Cards (Figure 17). OFF cards, produced by a special "End of Term Program", are produced once a semester. The OFF card has the same general format as the ON inventory card described above differing only in that the message reads OFF instead of ON and the inclusion of an actual copy number. As OFF cards are produced a minus (-) status symbol is added to the respective copy number in the file.

OFF cards are used to deprocess volumes from the reserve shelves, and as searching records for copies that cannot be located. Once a copy is deprocessed (i.e., taken from the reserve shelf and returned to its original location), its OFF card is returned to the computer, and the minus sign (-) is deleted from the appropriate copy number.

OFF cards are only produced for entries which have no current or future course NEED. For example, if three copies of a title are on active reserve for the Spring semester, and there is no NEED for that entry for the succeeding two semesters, an OFF card is produced. If a NEED does exist for either of the two succeeding semesters no OFF cards would be produced.

2.5.11. Cross-Reference List (Figure 18). Cross references are ENTered into the file as separate entries and appear in the Public Reference list and Master Worklist. A separate listing of all cross reference in the Master Reserve File is produced by a special program once a semester. The list is arranged alphabetically by author, and contains only that information needed for identification and verification of cross references (i.e., author, title, sequence number, and the body of the cross reference entry and its sequence number).

The list is referred to by the input typist when it is necessary to activate cross references. For example, when adding a course NEED to an entry which has the notation "X-REF" in the LOCation field, the typist looks up the entry in the Cross Reference list to find the sequence numbers of the cross references themselves. Once known, a dummy course NEED is prepared and submitted to the computer.

2.5.12. Historical Summaries. Various historical summaries are included in the reserve system design, and programs for these are being developed. The objective of these summaries is to supply the library with statistics:

1. relating to frequency and volume of reserve requests for specific titles and for broad classes of material
2. pinpointing reserve book needs (or excesses) of individual departments and professors.

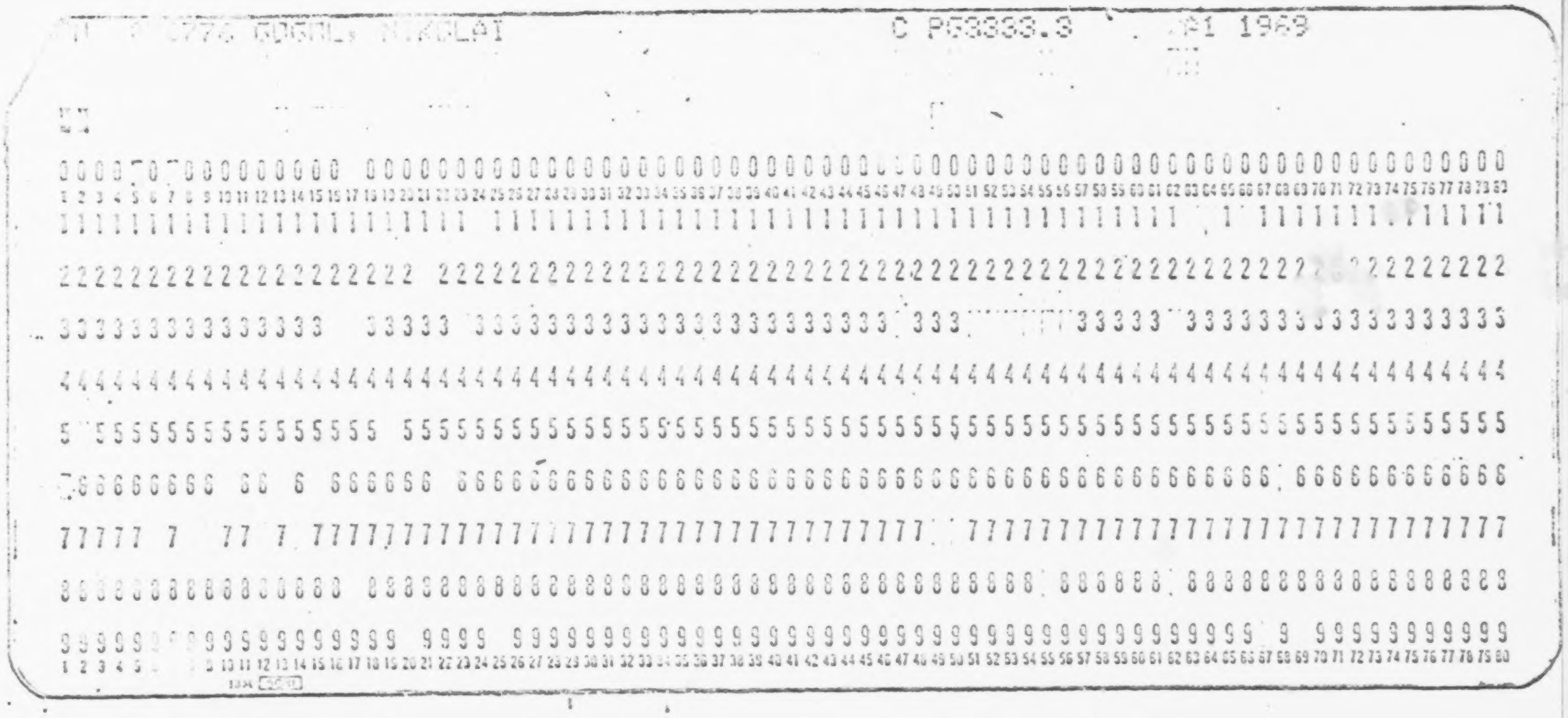

ON 070776 GOGOL, NIKOLAI
C PG3333.3
.A1 1969

FIGURE 15A

ON CARD AS RECEIVED FROM THE COMPUTER WITHOUT COPY NUMBER.

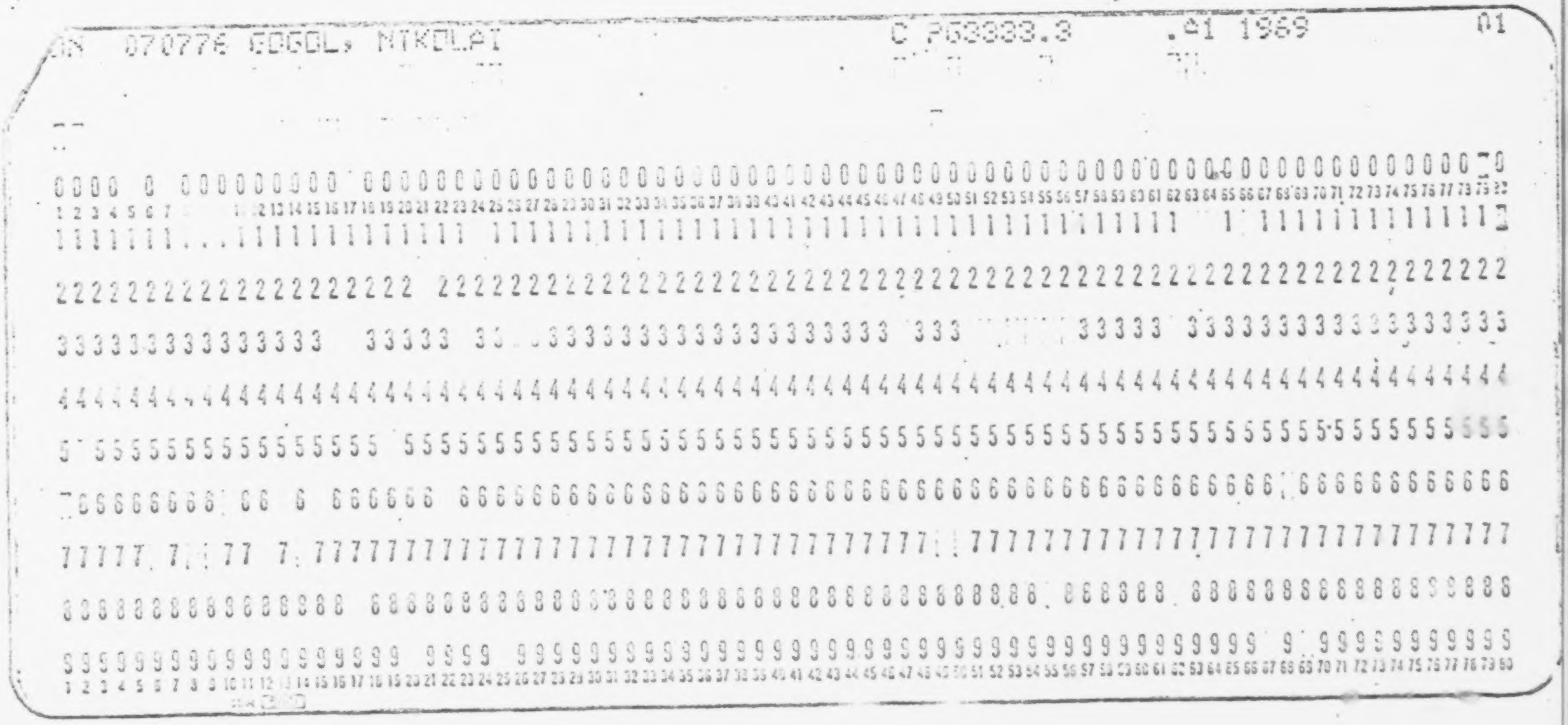

ON 070776 GOGOL, NIKOLAI
C PG3333.3
.A1 1969
01

FIGURE 15B.

ON CARD AS RETURNED TO THE COMPUTER WITH THE COPY NUMBER ADDED.

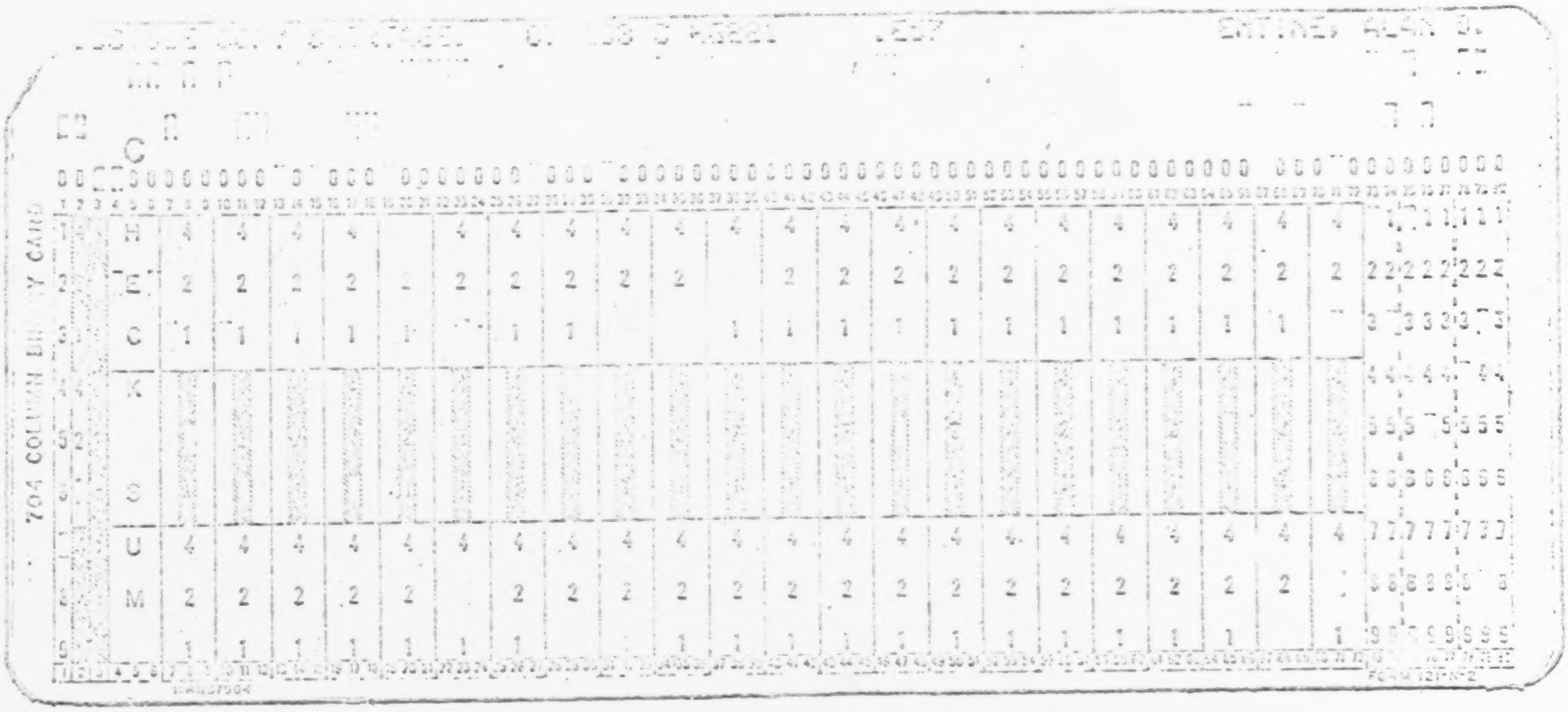

ENTINE, ALAN D.
704 COLUMN BINARY CARD
H
E
C
K
S
U
M

FIGURE 16

WARNING MESSAGE CARD
PRODUCED BY COMPUTER

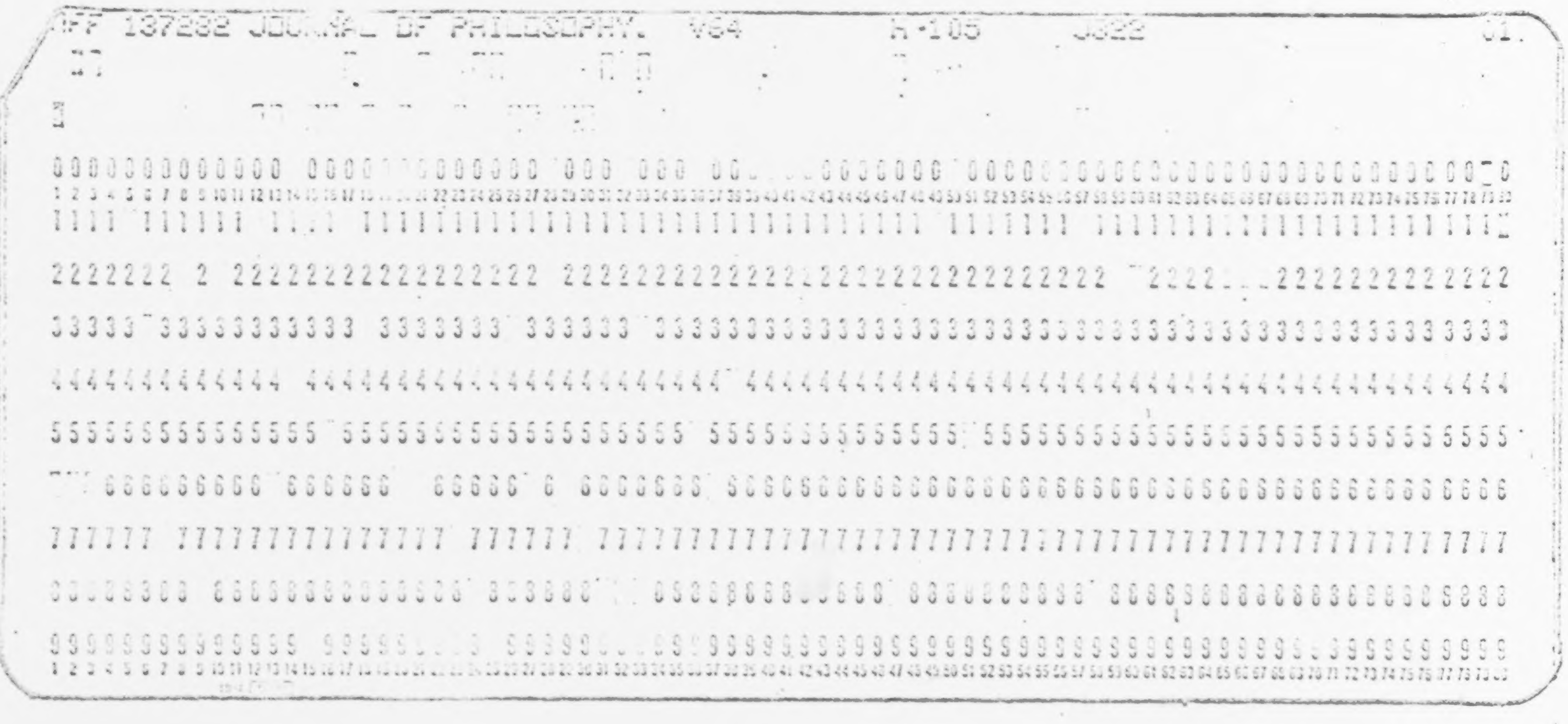

FF 137282 JOURNAL OF PHILOSOPHY. V64 H-105 J322 01.

FIGURE 17

OFF CARD

```
   RESERVES CROSS REFERENCES BY MAIN ENTRY AS OF  6/23/69    PAGE   6

ARNEGIE, ANDREW: GOSPEL CF WEALTH
  X  KIFKLAND, EDWARD C. ED.; GOSPEL OF WEALTH...                          133495

ALLENCE CF DEVELOPMENT
  X  WARD, R. - CHALLENGE OF DEVELOPMENT                                   097074

AMPION, DEAN: SOME IMPACTS OF OFFICE AUTOMATION UPON STATUS
  X  OF ICE AUTOMATION                                                     123355

EKHCV, ANTCN; LADY WITH THE DOG AND OTHER STORIES
  X  CHEKHCV, ANTON; IONITCH                                               133093

EKHCV, ANTCN; PORTABLE CHEKHOV
  X  CHEKHCV, ANTON;, ABCUT LOVE                                           133129
  X  CHEKHOV, ANTON; ATTACK OF NERVES                                      133118
  X  CHEKHCV, ANTCN; GOCSEBERRIES                                          133107
  X  CHEKHOV, ANTCN; MAN IN THE SHELL'                                     132427

ESTER MYSTERY PLAYS
  X  HUSSEY, MAURICE TR.; CHESTER MYSTERY PLAYS                            132748

W, S.C.; A LITERARY HISTORY OF ENGLAND
  X  NINETEENTH CENTURY AND AFTER                                          105928

NA QUARTERLY; CHINA UNDER MAO
  X  MACFARQUHAR, R. - CHINA UNDER MAO                                     108343

ETIEN DE TROYES
  X  TROYES, CHRETIEN DE; ARTHURIAN RCMANCES                               130344

ERO, MARCUS TULLIUS, M. TULLI CICERONIS SCRIPTA QUAE MANSERUN
  X  M. TULLI CICERCNIS SCRIPTA QUAE MANSERUNT OMNIA                       097029

CERO, R. HIRZEL. UNTERSUCHUNGER ZU CICEROS PHILOSOPHISCHE SCHR
  X  HIRZEL, R.; UNTERSUCHUNGER ZU CICEROS PHILOSHESCHE SCHRIFTEN 3 VOLS   096842

IZENS RESEARCH FOUNDATI  ; POLITICS OF NATIONAL CONVENTION FINANCES
  X  MCKEOUGH, KEVIN; CO  S OF POLITICAL PARTICIPATION...                  132553

TIZENS RESEARCH FOUNDATION; POLITICS OF NATIONAL CONVENTION...
  X   IBBY, JOHN F.; POLITCS OF NATIONAL CONVEN  ION FINANCES AND ARRANGEMENTS   132438

ALDEL, PAUL, THEATRE
  X  CLAUDEL, P. - LANNCUNCE FAITE A MARIE                                 096600

IFFORD, JAMES L.  ED.; EIGHTEENTH-CENTURY ENGLISH LITERATURE
  X   IGHTEENTH-CENTURY ENGLISH LITERATURE                                 133923

EN, STANLEY; AMERICAN ECONOMIC HISTORY
  X  VER STEEG, CLARENCE L.; AMERICAN REVOLUTION CONSIDERED AS AN ECONOMIC MOVE   132863
```

FIGURE 18

SAMPLE PAGE FOR THE CROSS REFERENCE LIST.

3. PROGRAM DESCRIPTION

The Reserves System consists of a Master Processing Program and a number of auxiliary programs. The main computer program processes bibliographic, inventory and course data and produces worklists and public lists; auxiliary programs provide additional facilities and maintenance functions. (See descriptions of the individual programs below.) All programs are written in OS/360 COBOL F. The Columbia implementation includes LASP/MVT, but this is not necessary. With minor changes in the JCL (Job Control Language), programs will operate in a conventional OS/360 environment.

3.1. The Main Program.

3.1.1. Purpose - The objectives of the reserve program are:

3.1.1.1. Inventory control. To continually maintain an inventory record of the number of copies of a particular title in stock, and to balance this inventory against anticipated course requirements for the current and coming academic terms.

To preserve historical records of previous terms' requirements, in order to help the librarian properly anticipate needs.

3.1.1.2. Processing and deprocessing. To aid in the manual task of processing volumes onto the active reserve shelf at the beginning of a term (assembling the reserve collection) and of deprocessing volumes off the active reserve shelf at the end of the semester (disbursing the reserve collection).

3.1.1.3. List production. To produce worklists for the librarian which give complete information about each title in the file.

To produce lists for public use, in both author and course (or professor) sequence which give only essential bibliographic information. (Public lists are made available as a book form catalog, and may be widely distributed.)

3.1.2. Input commands - Following is a listing and identification of computer processing functions:

3.1.2.1. ENT (enter). Used to establish initially a record on the file for a particular title. Once a record is established it remains on the file permanently, unless it is specifically deleted with the DEL (see below) command. Any and all data fields may be entered into the newly established record by means of this command. The computer assigns a new sequence number to the record, placing it at the end of the file. The sequence number assigned implies the record's relative track location within the file, and includes a machine-generated check digit. Thus, records may be retrieved randomly using this number as key. All user commands refer to the record in this way.

3.1.2.2. DEL (delete). Used to delete a title from the file. No further reference to the title record will be allowed nor will it appear in any list. The actual space on the disc is not relinquished for a new title; this is done by using an auxiliary command, SAVE.

3.1.2.3. MOD (modify). Used to alter the contents of the bibliographic data field in an already existing record on the file. Any bibliographic data field not specified when the record was originally established by an ENT is considered to contain blanks, and so may be modified in the same way as a bibliographic data field with informative contents.

3.1.2.4. ADD. Used to alter the contents of the copy inventory, course requirement, and/or on order data fields on an existing record by adding additional data to existing data elements and to enter additional course requirements to the course field.

3.1.2.5. SUB (subtract). The corrollary of the ADD command above.

3.1.2.6. ON. A one-card command produced by the computer. When course information is first entered, the computer flags all copy numbers associated with that record with a "+" sign. The computer then issues an ON card for each copy which must be processed onto reserve (determined by the contents of the incoming NEED field). Each ON card contains the command code "ON", the sequence number of the record, and selected bibliographic information. Actual copy numbers are not punched by the computer. As the librarian locates copies and places them on active reserve, the number of each copy is punched into an ON card for that title; the card is then returned to the computer, causing the "+" sign to be deleted from the specified copy number.

Adding additional courses or increasing the NEED of existing courses will cause additional ON cards to be issued but will not affect the copy number flags. The number of ON cards issued will not exceed the number of "+" flags remaining. If the value of the incoming NEED field exceeds the number of remaining "+" flags (hence the number of available copies) a warning message is issued which accompanies the ON cards.

When copies are added to a title record which includes course information, the new copy numbers will appear in the list with "+" signs..

Reducing either the NEED or the number of copies causes no automatic action by the computer.

3.1.2.7. OFF. A one-card command produced by the end-of-term program, and similar in function to the ON card (see above).

The end-of-term program flags each copy number which is to be processed off reserve (as determined by the program). An OFF card is produced for each copy and contains the command code "OFF", the sequence number of the title, selected bibliographic information, and a single copy number. These cards inform the librarian that specific copies are to be processed OFF reserve. As the copies are processed, OFF cards are returned to the computer causing the "-" sign to be deleted from the specified copy number.

3.1.2.8. CHK (check). Used to remove + and/or - flags from copy numbers. This is normally done by the ON and OFF functions (see above); the CHK function is only used to correct error conditions arising from incorrect input information. Up to 25 copy numbers may be referenced by a single CHK function.

3.1.2.9. SAVE. An auxilliary command issued by the computer on a punched card. When the entire file is periodically dumped for backup safety, the computer looks for records flagged as having been deleted by the DEL command, and generates a SAVE punched card for the space on the disk occupied by each deleted record. The SAVE card, containing the old record's sequence number which refers to the space on the disk, is then substituted for an ENT command card by the librarian, and the new record is established on the space formerly occupied by the deleted record, instead of being added to the end of the file.

The librarian need not wait for the computer to issue the punched card, but may key the SAVE command together with all the data fields appropriate to the ENT command.

3.1.3. Process control. The RUN card (see section 3.4.1.1.) specifies whether the run is to produce a Master List or Supplements to the previous Master List. A Master List contains all titles in the file; a Supplement List contains only those titles which have been ENTered or addressed by user commands since the last Master List was printed. Supplements are, therefore, cumulative.

The RUN card also specifies whether a Public List is to be produced. The Public List contains only bibliographic information for titles in the Worklist which are on current and active reserve. (i.e., those titles which have both at least one course and at least one copy number without a plus or minus symbol.)

3.1.4. Inventory balancing and control. The program stores up to 99 two-digit copy numbers for each entry. These are entered either by the ENTer or ADD command, and may be deleted by the SUBtract command.

Each title record can also contain information for up to eight courses. This information includes the number of copies required for each course, and is entered either by the ENTer or ADD command. The number of copies required (NEED) may be modified by the ADD or SUBtract command. Courses may be deleted by the SUBtract command.

The program groups courses for each title by term (up to three terms) and adds the NEED data fields for all courses in each term, printing a total need for each term. The number of copies listed as inventory is totaled and printed as the total number of copies on hand. The total NEED and the total inventory on hand are compared and any difference is printed as the SHORTAGE for that term.

Additional inventory control is provided both by the main program and by the end-of-term program in the form of ON and OFF cards. (See sections 3.1.2.6. and 3.1.2.7.).

3.1.5. Hardware and software environment. The Main Reserves Program requires the following devices in its present implementation at Columbia:

A random access device for main file residence;
A card reader/punch for input and punched card output;
A printer for the various lists.

In addition, sequential file space is needed for the four alphabetical indices. (In the Columbia implementation, this is on the same direct access device as the main file (two 2311 disk drives) but could as well be four tape drives or any other sequential devices).

Printed and punched output is spooled onto direct access by OS/MVT/LASP and printed or punched under system control after the run is complete. This could also be done using tapes or a minimum of three online printers and a punch.

The main program requires at present approximately 170K bytes of main storage, which allows a maximum of 2000 transactions in a single run. (Each transaction causes an index record to be generated and saved in an array in main storage). By reducing the number of transactions permitted in a single run, the storage requirement could be reduced by as much as 80K bytes.

Running time is primarily dependent on how many titles are printed in the Worklist. Typical running time for a file of 12,000 titles is 6 minutes. This includes only CPU cycles utilized plus a 28 millisecond penalty for each I/O instruction which induces a WAIT state.

3.2. Auxiliary Programs

3.2.1. Professor/Course list program. Bibliographic and course information is extracted from the file, sorted, and edited to produce a series of alphabetical lists, each containing the titles on reserve for a single Professor/Course combination in the current term. These lists appear alphabetically by Professor and Course, and each begins a new page, allowing them to be separated and sent to respective professors notifying them of titles placed on reserve for their course. A title which has more than one current course field in the Master File will appear in more than one such list.

Within each list, there are two alphabetical subsections. The first includes all titles which have in fact been processed onto active reserve (as indicated by the presence in the Master File of at least one copy number having no plus flag). The second includes those titles which have no such unflagged copy numbers, indicating that they are being processed for reserve. Any items in this second section which have no copy numbers (indicating no inventory) and, in addition, have a zero value in the Order field, are also printed in a separate Inventory Check list as a reminder to the librarian that copies must be ordered.

The program requires a direct access divice for main file residence, an on- or offline printer in addition to the system logical output device, and sorting capability. The amount of main storage required is approximately 10K bytes plus space for a sort program.

3.2.2. End of term program. The three terms which the main program can accommodate are moved forward by one term. If this causes the total NEED to drop to zero, deprocessing OFF cards will be issued for all unflagged copy numbers. Courses being deleted from the file are written on an historical file for later reference and statistical summary. Each tape record of this file contains one course field and the sequence number of the title with which it was associated.

The program requires a direct access device for main file residence, and system logical input and output, including punch. Since the number of OFF cards may be large, it might be preferable for the punch to be off line, but this is not necessary. Main storage requirement is approximately 10K bytes.

3.2.3. Cross reference list program. An alphabetical list of all entries which are cross-referenced in the Master File is produced by this program. Following each entry is a list of all references to it.

Cross-references are distinguished in the Master File by the keyword SEE in the Title field, which contains both author and title of the referenced main entry.

The program requires a direct-access device for main file residence, an output printer in addition to system logical output, and sorting capability.

Main storage requirement is approximately 5K bytes plus space for the sort program.

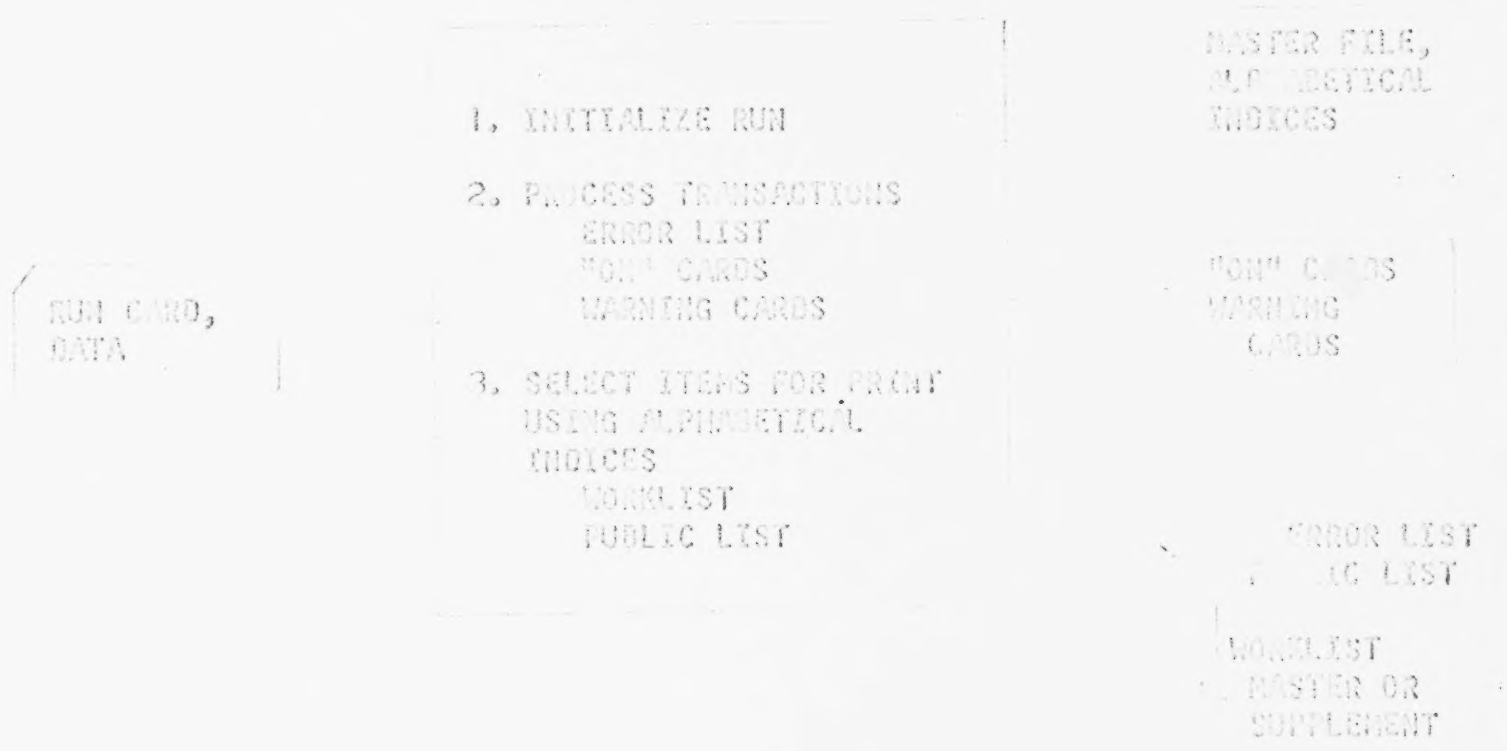
3.2.4. Historical summary program. [being developed]

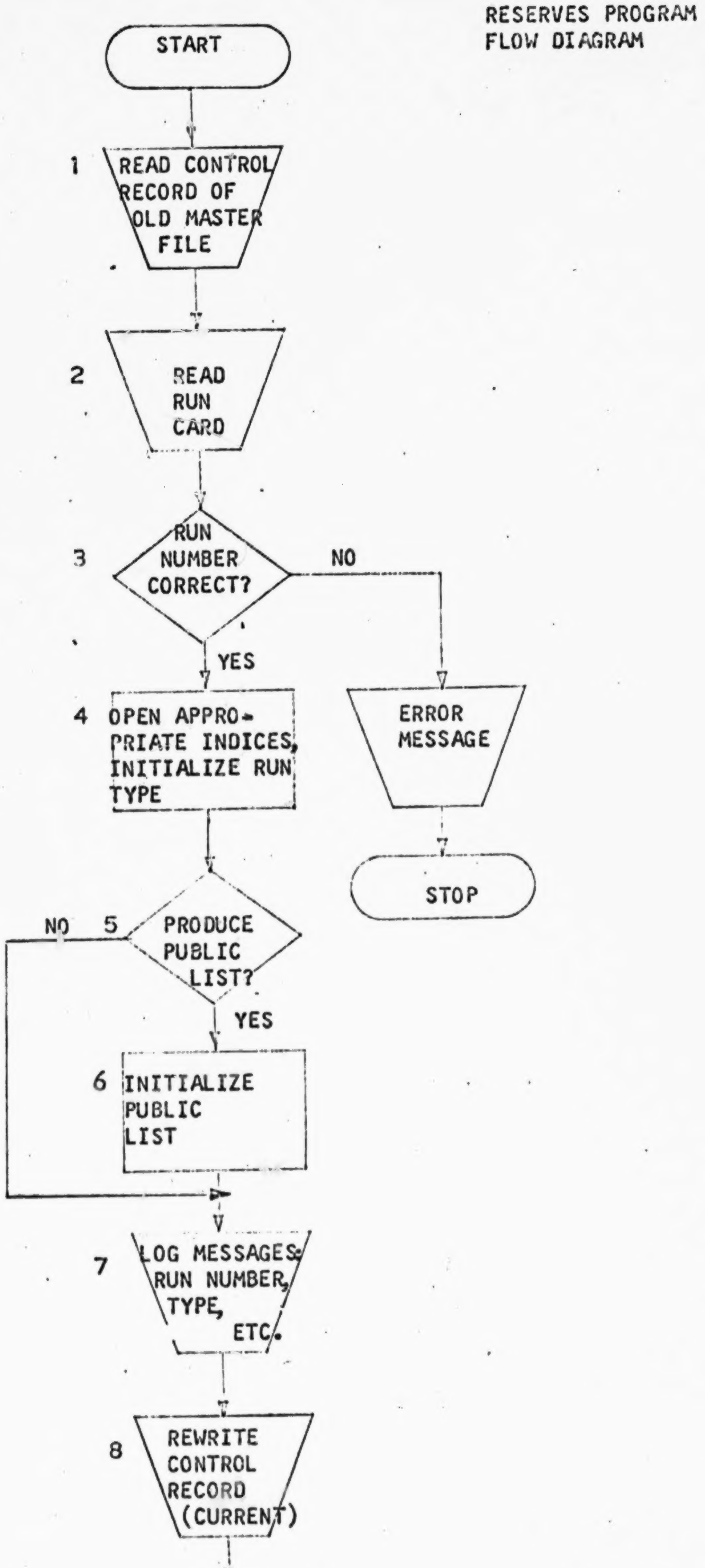
APPENDIX A

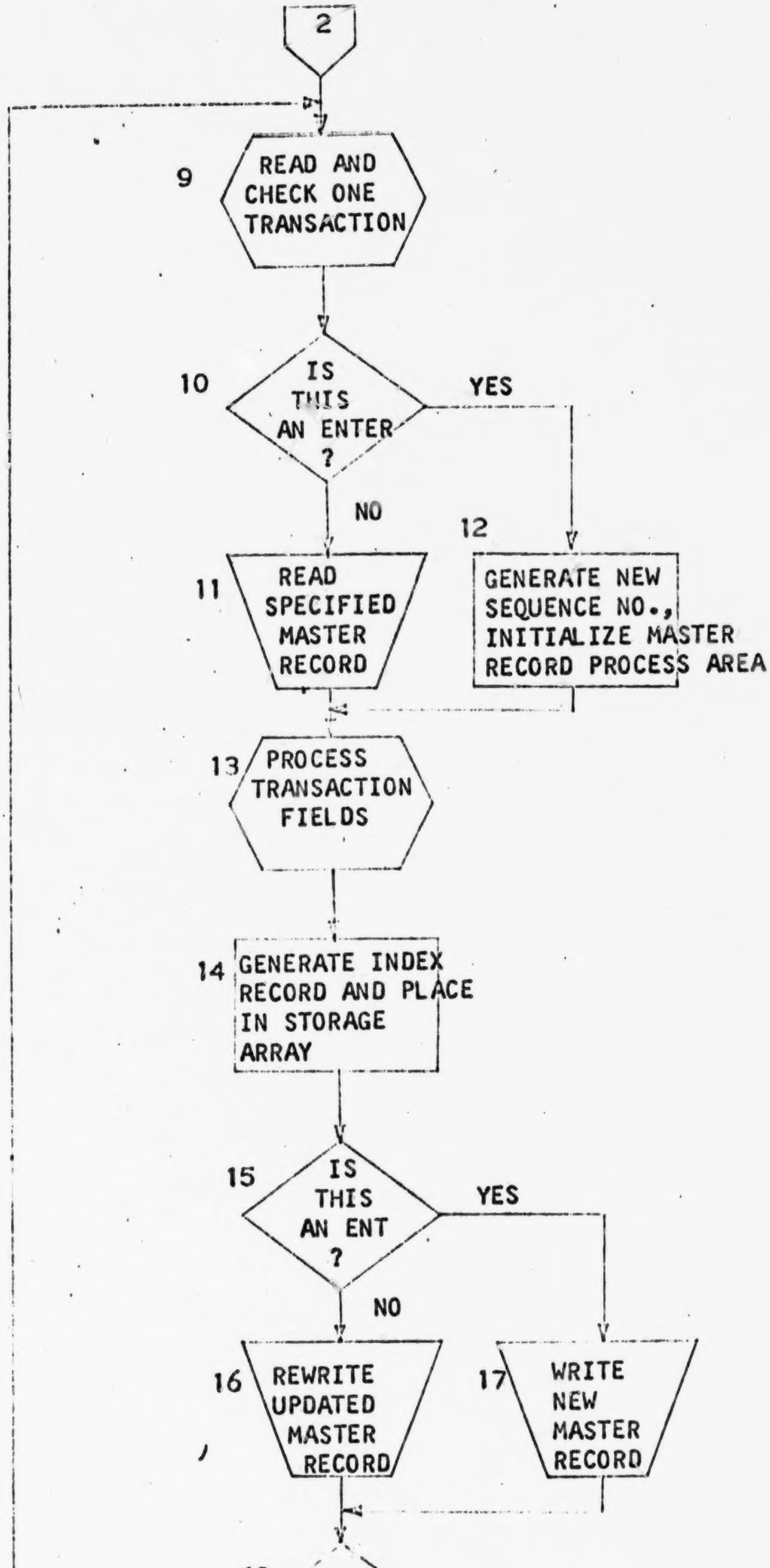
DETAIL FLOW DIAGRAM - EXPLANATORY NOTES

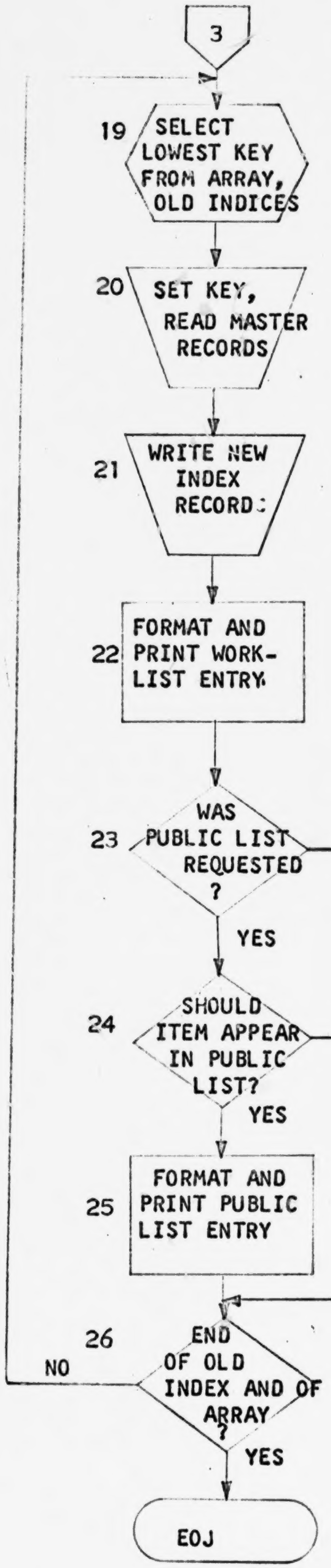
2

OVERALL FLOW DIAGRAM


RUN CARD,
DATA
1. INITIALIZE RUN
2. PROCESS TRANSACTIONS
ERROR LIST
"ON" CARDS
WARNING CARDS
3. SELECT ITEMS FOR PRINT
USING ALPHABETICAL
INDICES
WORKLIST
PUBLIC LIST
MASTER FILE,
ALPHABETICAL
INDICES
"ON" CARDS
WARNING
CARDS
ERROR LIST
PUBLIC LIST
WORKLIST
MASTER OR
SUPPLEMENT

RESERVES PROGRAM
FLOW DIAGRAM
START
1
READ CONTROL RECORD OF OLD MASTER FILE
2
READ RUN CARD
3
RUN NUMBER CORRECT?
NO
YES
ERROR MESSAGE
STOP
4
OPEN APPROPRIATE INDICES, INITIALIZE RUN TYPE
5
PRODUCE PUBLIC LIST?
NO
YES
6
INITIALIZE PUBLIC LIST
7
LOG MESSAGES: RUN NUMBER, TYPE, ETC.
8
REWRITE CONTROL RECORD (CURRENT)
2


2
9
READ AND CHECK ONE TRANSACTION
10
IS THIS AN ENTER ?
YES
NO
11
READ SPECIFIED MASTER RECORD
12
GENERATE NEW SEQUENCE NO., INITIALIZE MASTER RECORD PROCESS AREA
13
PROCESS TRANSACTION FIELDS
14
GENERATE INDEX RECORD AND PLACE IN STORAGE ARRAY
15
IS THIS AN ENT ?
YES
NO
16
REWRITE UPDATED MASTER RECORD
17
WRITE NEW MASTER RECORD
18
WAS THE TRANSACTION THE LAST ?
NO
3


3
19
SELECT LOWEST KEY FROM ARRAY, OLD INDICES
20
SET KEY, READ MASTER RECORDS
21
WRITE NEW INDEX RECORD:
22
FORMAT AND PRINT WORK-LIST ENTRY
23
WAS PUBLIC LIST REQUESTED ?
NO
YES
24
SHOULD ITEM APPEAR IN PUBLIC LIST?
NO
YES
25
FORMAT AND PRINT PUBLIC LIST ENTRY
26
END OF OLD INDEX AND OF ARRAY ?
NO
YES
EOJ

DETAIL FLOW DIAGRAM - EXPLANATORY NOTES

1. The control record contains the following information about the last (previous) run:
   Serial number and date.
   Whether MASTER or SUPPL. worklist was produced.
   Highest sequence number assigned.
   Index configuration.
   The date of the most recent MASTER run. (If the last run was a MASTER, this date will be the date of that run.)

2. The RUN card supplies the following information:
   Serial number of the current run.
   Whether MASTER or SUPPL. worklist is desired.
   Whether Public List is desired.

3. Check of RUN number prevents accidental re-run of data.

4. Four indices are maintained by the program, two for MASTER lists and two for SUPPL. lists. The correct configuration is automatically selected by the program. Flags are set indicating which lists are to be produced.

5. Determined from RUN card.

6. Appropriate headings are generated and the output file for the Public list is opened.

7. The updated control record reflecting information for the current run is printed, along with the previous control record, the RUN card, and a message indicating whether the Public list has been initiated.

8. The current control record is held in storage throughout the run, and is also written into the master file at this time to assure the correct RUN number being saved in case of subsequent system failure or abnormal termination.

9. As each transaction is read, the header is first checked for validity. Subsequent fields must then conform to the format for that type of transaction. Any error will cause the transaction to be rejected and error messages to be printed. The input cards will be printed following the message; this continues until a valid header card is read.

10. Determined from the transaction header card.

11. The access key is the sequence number punched on the transaction header card.

12. The sequence number stored in the control record is incremented by one and a check digit computed. The record processing area is initialized with all alphanumeric fields blank and all numeric fields set to zero.

13. Further error checking takes place here. Certain errors will cause warning messages only to be printed; others will cause the erroneous field(s) to be discarded and error messages to be printed. In any case where fields are discarded, the error message includes a complete listing of the transaction cards as submitted. In transactions which permit multiple operations, only the affected operation is discarded. For example, if an ENTer transaction includes a Course whose TERM is unacceptable to the program, only the course information will be rejected. The bibliographic information, and inventory information, if any, will be processed normally. The error messages are specific.

14. The index record contains portions of the AUTHor and TITLe fields of the master record, and its sequence number. All index records generated during the process phase are held in storage in an array, and then merged alphabetically with the old index file during the output or printing phase. These indices provide for selection of master records in alphabetical order for printing in the Worklist and Public list.

15. As determined from the transaction header card.

16. The updated master record is rewritten in place in the master file, replacing the old record.

17. A new master record is written, using as key the new sequence number generated by the program.

18. Processing of transactions continues until all input has been exhausted.

19. The lowest (i.e. earliest in alphabetical order) index record is selected from the storage array (see Box 14) and compared to the incoming old index record. The lowest of these is placed in an intermediate area. If the record is taken from the storage array, its position is set to blanks. If the incoming index record is chosen, another record is read from the appropriate index. Duplicate index records are deleted.

20. The record key is found in the index record. The master record is compared with the alphabetic portion of the index record. Failure to match indicates that the AUTHor and/or TITLe fields of the master record have been changed by the MODify function, and therefore the current index record no longer represents the correct position in the alphabetical lists. Since the MODify function generates a new index record, the outdated index record is deleted.

21. If correct, the current index record is written into the new index.

22. The fields of the master record are properly formatted and printed in the Worklist.

23. As determined by the RUN card.

24. Two criteria determine an entry's appearance in the public list; The presence of at least one course field and presence of at least one copy number without flags.

25. The fields of the master record are properly formatted and printed in the Public list.

26. Processing continues until both the old index files and the storage array of new index records are exhausted.

APPENDIX B

INPUT CARD FORMATS

Input card formats:

1. RUN card.

Columns	Contents
1 - 4	RUN=
5 - 8	Serial number of the current run, with leading zeros.
9	blank
10-15	MASTER if a Master Worklist is desired, SUPPL. if a Supplementary Worklist is desired.
16	blank
17-19	PUB if a Public List is desired; otherwise blank.
20-80	Unused (may contain comments)

2. ON and OFF cards.

Columns	Contents
1 - 4	ON or OFF
5 -10	Sequence number of record to be referenced.
11	unused
12-45	Author of referenced title (optional, does not affect processing)
46	unused
47-76	Call number of referenced title (optional, does not affect processing)
77-78	unused
79-80	Copy number to be tested, with leading zero if any.

3. Transaction Header cards.

Columns	Contents
1 - 4	Transaction code (ENT, ADD, SUB, MOD, CHK, SAVE)
5 -10	Sequence number of the record to be referenced.
11-80	unused

4. Data field cards.

Each data field is identified by its name in columns 1 - 4. Data begins in column 5 for all fields, but formats differ and are shown below. Unused areas of the card should be left blank.

In the table below, an X opposite a field name indicates that the field is optional in the transaction(s) at the top of the column in which the X appears.

Symbols used in the table: b̸ = blank d = decimal digit x = alphanumeric

Field name	Transaction codes				Data format (begin in cc5)
	ENT SAVE	ADD SUB	MOD	CHK	
AUTH	X[1]		X		xxx...up to 76 characters
TITL	X		X		xxx...up to 76 characters
EDTN	X		X		xxx...up to 10 characters
DATE	X		X		xxx...up to 10 characters
CALL	X		X		xxx...up to 30 characters
LOCN	X		X		xxx...up to 10 characters
COPY	X	X		X	b̸ddb̸ddb̸dd...up to 25 occurrences
ORDR	X	X			b̸dd
CRSE	X[2]	X[2]			xxx...up to 15 characters
PROF	X	X			xxx...up to 15 characters
TERM	X	X			ddd
NEED	X	X[3]			b̸dd

1. AUTH field is required in ENT and SAVE transactions.
2. CRSE, PROF, TERM and NEED fields must appear in combination.
3. Need field may be omitted when Course information is included in a SUB transaction, in which case it will be considered to be equal to the existing NEED.

The DEL transaction does not include any data fields, but must be followed by a trailer ("Q") card. (See below)

5. Transaction Trailer cards.

The field cards for a single transaction must be followed by a trailer card having a "Q" in column 1, and the remainder of the card blank.

APPENDIX C

ERROR MESSAGES AND ACTION TAKEN

Error Messages and Action Taken.

Errors arising from the RUN card.

RUN CARD MISSING OR INVALID.

a) The RUN card was not the first data card.
b) It was not properly identified by the characters RUN= in columns 1-4.
c) The run specification (MASTER or SUPPL.) was not recognizable.

Action: The program terminates immediately.

RUN NUMBER INCORRECT. MUST BE nnnn

The run number specified on the RUN card is not the number of the current run as determined by the computer. nnnn specifies the correct number.

Action: The program terminates immediately.

Transaction headers and data formats.

NOT A VALID HEADER: xxx...

The first card following the RUN card or a previous transaction does not have one of the transaction codes in columns 1-4. The card-image is included in the message.

Action: The card is discarded and the next card read. This may be repeated until a valid transaction code is read.

THE FOLLOWING IS NOT A VALID FORMAT, AND HAS BEEN REJECTED.

a) A complete transaction has been read, but the fields included are not a permissible combination for that transaction.

Action: The transaction is discarded and the cards listed following the message.

b) While reading a transaction, a duplicate or unrecognizable field identifier has been encountered.

Action: The transaction is discarded and the cards listed following the message. Cards will continue to be discarded and listed until a transaction trailer card ("Q") is encountered.

INVALID SEQUENCE NUMBER:

In any transaction except ON, OFF, or SAVE, (see below) the sequence number field is incorrectly punched, or no record exists for that number.

Action: The transaction is discarded and the cards listed following the message.

INVALID SEQUENCE NUMBER: xxx...
SUBSTITUTING "ENT"

In a SAVE transaction, the sequence number field is incorrectly punched, or does not represent an available record area. The text of the SAVE header is shown.

Action: The transaction is changed by the program to an ENT transaction, and a new sequence number is generated.

INVALID SEQUENCE NUMBER: xxx...

The sequence number field on an ON or OFF card is incorrectly punched or no record exists for that number. The card-image is shown.

Action: The card is discarded.

SEQUENCE NUMBER IN USE: xxx...
SUBSTITUTI "ENT"

A SAVE transaction specifies a sequence number which represents a record in the file which has not been deleted.

Action: The SAVE transaction is changed by the program to an ENT transaction, for which a new sequence number is generated.

DELETING RECORD nnnnn xxx...

The sequence number shown was specified on a DEL transaction. The contents of the Author field of the record are also shown.

Action: The record is deleted from the file. This message is provided for verification purposes.

ON and OFF cards.

Each message includes the text of the card which caused the error.

Action: In each case, the error card is ignored.

COPY NUMBER INCORRECTLY PUNCHED: xxx...

The contents of the copy number field are non-numeric.

ZERO COPY ILLEGAL: xxx...

The copy-number field contains zeros, not valid as a copy number.

CANNOT LOCATE COPY: xxx...

The specified copy number is not represented in the record.

NOT FLAGGED PLUS: xxx...   (ON card)
NOT FLAGGED MINUS: xxx...   (OFF card)

The specified copy number is not flagged as assumed by the ON or OFF card.

Bibliographic data fields. (Identifiers AUTH, TITL, EDTN, DATE, CALL, LOCN)

nn BIB FIELD(S) TRUNCATED. aaaa nnnnnn AUTH=xxx...

In an ENT or MOD transaction, the indicated number of bibliographic data fields were longer than the permissible length and were truncated. The transaction code and sequence number, and the contents of the Author field (after processing) are shown.

Action: Processing continues.

Knowledge of certain aspects of transaction processing is helpful in interpreting the following messages. Briefly, these are the important points:

a) ENT, ADD and SUB transactions may each include any combination of inventory and course information.

b) When both inventory and course information are included, the inventory information is processed first. Error in inventory processing will not prevent processing of course information, but may affect the result.

c) Course information in the file consists of the input fields CRSE, PROF, TERM and NEED. The first three identify the course field and must always appear in combination.

d) To avoid confusion when multiple error and warning messages are produced the card input is listed only once on the error list. Thus all messages for a single transaction appear together, followed by the text of the input cards. The contents of the Author field are added to the text of the transaction header card.

The COPY field.

COPY xnn NOT FOUND.

A copy number specified in a SUB or CHK transaction is already in the specified record.
Action: The copy number is not processed. The error count for the COPY field is incremented. (see below)

ADDED DUPLICATE COPY xnn, WARNING ONLY.

A copy number specified in an ADD or ENT transaction is already in the specified record.
Action: The Last Copy indicator will reflect the current input. The error count for the COPY field is incremented. (see below)

nn ERRORS IN COPY FIELD. CHECK RESULT.

Indicates the total number of errors encountered in processing the COPY field, including unrecognizable information and incorrectly positioned numbers. The librarian should check the final result in the Worklist, and make necessary corrections.

The ORDR field.

ORDR FIELD IS INCORRECTLY PUNCHED OR VALUE IS UNACCEPTABLE.

a) In an ENT, ADD or SUB transaction, the contents of the ORDR field are invalid.

b) In an ADD transaction, the ORDR field contains a value which if added to the current On Order field will exceed the maximum permissible value (99).

c) In a SUB transaction, the ORDR field contains a value greater than the current On Order.
Action: The ORDR field is not processed.

Course information fields.

CRSE FIELD TRUNCATED. (and/or) PROF FIELD TRUNCATED.

The contents of the specified field(s) exceed the maximum permissible length.
Action: The field is truncated before processing.

ADDED SAME COURSE, CHECK NEW NEED.

In an ADD transaction, the course identification fields match an existing course in the specified record.
Action: The specified NEED is added to the existing Need for that course.

DELETING COURSE.

In a SUB transaction, the NEED field has been omitted, or contains a value equal to the current Need for the specified course.
Action: The course field is deleted from the file.

COURSE INFORMATION NOT PROCESSED.

This message will always be preceded by one of the five messages shown below.
Action: The course information fields have not been processed for the reason given.

TERM NOT ACCEPTABLE, OR INCORRECTLY PUNCHED:

The contents of the TERM field do not match any of the three terms recognized by the program.
Action: The course information cannot be processed. See above.

NEED FIELD IS INCORRECTLY PUNCHED:

The contents of the NEED field are invalid.
Action: The course information cannot be processed. See above

NEED IS TOO LARGE:

a) In an ADD transaction, specify an existing course, the NEED field contains a value which if added to the existing Need for that course would exceed the maximum permissible value.
b) In an ADD transaction, the NEED field contains a value which if added to the Total Need for the specified term will exceed the maximum permissible value.
c) In a SUB transaction, the NEED field contains a value larger than the existing Need for the course specified.

Action: The course information cannot be processed. See above

CANNOT LOCATE COURSE:

In a SUB transaction, the CRSE, PROF and TERM fields do not match an existing course field in the specified record.
Action: The course information cannot be processed. See above.

CANNOT ADD ANOTHER COURSE:

An ADD transaction specifies course information for a record which already contains the maximum number of courses, and the specified fields do not match one of the existing courses.
Action: The course information cannot be processed. See above.

Output phase.

MOD AUTH/TITL nnnnnn WAS: xxx... NOW: xxx...

The current index record has selected a master file record whose Author and/or Title fields have been MODified in such a way that the position of the record in the alphabetical lists has changed. The sequence number is shown along with the alphanumeric portion of the current index record (WAS: xxx...) and a construct of the same portion of the index record generated at the time the MOD transaction was processed (NOW: xxx...).
Action: The current index record is deleted.

Errors arising internally.

These messages are generated by routines which are included in the program for logical consistency, but will normally be executed only in cases of undetected machine error or program error.

OPEN ROUTINE FAILED.

In the initialization phase, the program has failed to select the correct indices for the current run. All relevent program flags and assignment indicators are listed following the message.
Action: The program terminates immediately.

FILE SELECT #nn FAILED.

In the output phase, the program has failed to select the proper index in a read or write operation. nn specifies the point in the program at which the error was detected. All relevent program flags and assignment indicators are listed following the message.
Action: The program closes all active files and terminates.

APPENDIX D

PROGRAM LISTINGS

1. The Main Program (COLLRESV)
2. The End-of-Term Program (COLLTERM)
3. The Professors' Lists Program (RESVPROF)
4. The Cross Reference Program (XREFRESV)

```
LEVEL 1JAN67                                                   COBOL F

    1

00001   000100 IDENTIFICATION DIVISION.                                       COLLRESV
00002   000200 PROGRAM-ID. 'COLLRESV'.                                        COLLRESV
00003   000300 AUTHOR. H. J. HETLAND.                                         COLLRESV
00004   000400 DATE-COMPILED. SEP 18,1969                                     COLLRESV
00005   000500 ENVIRONMENT DIVISION.                                          COLLRESV
00006   000600 INPUT-OUTPUT SECTION.                                          COLLRESV
00007   000700 FILE-CONTROL.                                                  COLLRESV
00008   000800         SELECT MASTER-FILE ASSIGN 'COLMAS' DIRECT-ACCESS       COLLRESV
00009   000900         ORGANIZATION DIRECT  ACCESS RANDOM                     COLLRESV
00010   001000         SYMBOLIC SEONFF  ACTUAL TRKEY.                         COLLRESV
00011   001100         SELECT TAPE1 ASSIGN 'COLX1' UTILITY.                   COLLRESV
00012   001200         SELECT TAPE2 ASSIGN 'COLX2' UTILITY.                   COLLRESV
00013   001300         SELECT TAPE3 ASSIGN 'COLX3' UTILITY.                   COLLRESV
00014   001400         SELECT TAPE4 ASSIGN 'COLX4' UTILITY.                   COLLRESV
00015   001500         SELECT CDIN ASSIGN 'SYSIN' UTILITY RESERVE 7.          COLLRESV
00016   001600         SELECT PRINT-FILE ASSIGN 'WORKLIST' UTILITY RESERVE 1. COLLRESV
00017   001700         SELECT PNOUT ASSIGN 'ONCARDS' UTILITY.                 COLLRESV
00018   001800         SELECT PUBLIC-LIST ASSIGN 'PUBLIST' UTILITY.           COLLRESV
00019   001900         SELECT SEONLIST ASSIGN 'SEONLIST' UTILITY RESERVE 1.   COLLRESV
00020   002000 I-O-CONTROL.                                                   COLLRESV
00021   002100         SAME AREA CDIN SEONLIST PRINT-FILE.                    COLLRESV
00022   002200         APPLY RESTRICTED SEARCH 1 ON MASTER-FILE.              COLLRESV
00023   002300 DATA DIVISION.                                                 COLLRESV
00024   002400 FILE SECTION.                                                  COLLRESV
00025   002500 FD  MASTER-FILE                                                COLLRESV
00026   002600         RECORDING F LABEL RECORD STANDARD DATA RECORD MASTER-RECORD. COLLRESV
00027   002700 01  MASTER-RECORD.                                             COLLRESV
00028   002800  02        PR          PICTURE 9     COMPUTATIONAL-3.          COLLRESV
00029   002900  02        BIB.                                                COLLRESV
00030   003000   03         AUTH      PICTURE X(76).                          COLLRESV
00031   003100   03         TITL      PICTURE X(76).                          COLLRESV
00032   003200   03         EDTN      PICTURE X(10).                          COLLRESV
00033   003300   03         DATN      PICTURE X(10).                          COLLRESV
00034   003400   03         CALN      PICTURE X(30).                          COLLRESV
00035   003500   03         LOCN      PICTURE X(10).                          COLLRESV
00036   003600  02         INVENT.                                            COLLRESV
00037   003700   03         ORDR      PICTURE 99.                             COLLRESV
00038   003800   03         NCP       PICTURE 99.                             COLLRESV
00039   003900  02         CPFF.                                              COLLRESV
00040   004000   03         CPF       PICTURE 9     COMPUTATIONAL-3  OCCURS 99. COLLRESV
00041   004100  02         CRSES.                                             COLLRESV
00042   004200   03         NCRSE     PICTURE 99    COMPUTATIONAL-3.          COLLRESV
00043   004300   03         INEED     PICTURE 99    OCCURS 3.                 COLLRESV
00044   004400   03         SHORT     PICTURE S99   OCCURS 3.                 COLLRESV
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```
00045   004500   03         CRSE               OCCURS 9.                                COLLRESV
00046   004600    04        NEED  PICTURE 99.                                           COLLRESV
00047   004700    04        CID.                                                        COLLRESV
00048   004800     05   ,    TERM PICTURE 999.                                          COLLRESV
00049   004900     05        CRID.                                                      COLLRESV
00050   005000      06        CRSE PICTURE X(15).                                       COLLRESV
00051   005100      06        PROF PICTURE X(15).                                       COLLRESV
00052   005200 FD  CDIN RECORDING F LABEL RECORD OMITTED DATA RECORD CARDIN.            COLLRESV
00053   005300 01   CARDIN.                                                             COLLRESV
00054   005400  02  CRDE          PICTURE XXXX.                                         COLLRESV
00055   005500  02  IB.                                                                 COLLRESV
00056   005600   03  IC           PICTURE X     OCCURS 76.                              COLLRESV
00057   005700  02  IBRF          REDEFINES IB.                                         COLLRESV
00058   005800   03  IBR          PICTURE 9(6).                                         COLLRESV
00059   005900   03  FILLER       PICTURE X(67).                                        COLLRESV
00060   006000   03  IBCF.                                                              COLLRESV
00061   006100    04  FILLER      PICTURE X..                                           COLLRESV
00062   006200    04  IBCN        PICTURE 99.                                           COLLRESV
00063   006400  02  IRTF          REDEFINES IB.                                         COLLRESV
00064   006500   03  INFUN        PICTURE XXXX.                                         COLLRESV
00065   006600   03  IRT          PICTURE X(7).                                         COLLRESV
00066   006700   03  IASSE.                                                             COLLRESV
00067   006800    04  IDIN        PICTURE 9.                                            COLLRESV
00068   006900    04  IOUT        PICTURE 9.                                            COLLRESV
00069   007000    04  IWIN        PICTURE 9.                                            COLLRESV
00070   007100    04  IEXT        PICTURE 9.                                            COLLRESV
00071   007200   03  IASSN  REDEFINES IASSE  PICTURE 9999.                              COLLRESV
00072   007300   03  FILLER       PICTURE X(61).                                        COLLRESV
00073   007400 FD  PRINT-FILE                                                           COLLRESV
00074   007500     RECORDING F BLOCK 5 RECORDS LABEL RECORD OMITTED                     COLLRESV
00075   007600     DATA RECORD PRTLN.                                                   COLLRESV
00076   007700 01  PRTLN.                                                               COLLRESV
00077   007800  02  FILLER  PICTURE X.                                                  COLLRESV
00078   007900  02  PRTDTA  PICTURE X(132).                                             COLLRESV
00079   008000 FD  SEQNLIST                                                             COLLRESV
00080   008100     RECORDING V BLOCK 10 RECORDS LABEL RECORD OMITTED                    COLLRESV
00081   008200     DATA RECORD SLREC.                                                   COLLRESV
00082   008300 01  SLREC          PICTURE X(66).                                        COLLRESV
00083   008400 FD  PNOUT                                                                COLLRESV
00084   008450     BLOCK 8 RECORDS
00085   008500     RECORDING F LABEL RECORD OMITTED DATA RECORD CARDOUT.                COLLRESV
00086   008600 01  CARDOUT.                                                             COLLRESV
00087   008800  02  PNDTA PICTURE X(80).                                                COLLRESV
00088   008900 FD  PUBLIC-LIST                                                          COLLRESV
00089   009000     RECORDING F BLOCK 5 RECORDS LABEL RECORD OMITTED                     COLLRESV
00090   009100     DATA RECORD PUBLN.                                                   COLLRESV
00091   009200 01  PUBLN.                                                               COLLRESV
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00092    009300  02  FILLER PICTURE X.                                               COLLRESV
00093    009400  02  PUBDTA  PICTURE X(132).                                         COLLRESV
00094    009500 FD  TAPE1 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD         COLLRESV
00095    009600         DATA RECORD TREC1.                                           COLLRESV
00096    009700 01  TREC1  PICTURE X(43).                                            COLLRESV
00097    009800 FD  TAPE2 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD         COLLRESV
00098    009900         DATA RECORD TREC2.                                           COLLRESV
00099    010000 01  TREC2  PICTURE X(43).                                            COLLRESV
00100    010100 FD  TAPE3 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD         COLLRESV
00101    010200         DATA RECORD TREC3.                                           COLLRESV
00102    010300 01  TREC3  PICTURE X(43).                                            COLLRESV
00103    010400 FD  TAPE4 RECORDING F BLOCK 40 RECORDS LABEL RECORD STANDARD         COLLRESV
00104    010500         DATA RECORD TREC4.                                           COLLRESV
00105    010600 01  TREC4  PICTURE X(43).                                            COLLRESV
00106    010700 WORKING-STORAGE SECTION.                                             COLLRESV
00107    010800 77  AA            PICTURE 999.                                       COLLRESV
00108    010810 77  A        PICTURE 9 COMPUTATIONAL-3.                              COLLRESV
00109    010820 77  B        PICTURE 9 COMPUTATIONAL-3.                              COLLRESV
00110    010900 77  CD             PICTURE S99 COMPUTATIONAL VALUE 0.                COLLRESV
00111    011000 77  CRF          PICTURE X.                                          COLLRESV
00112    011100 77  CX             PICTURE S9999 COMPUTATIONAL VALUE 0.              COLLRESV
00113    011200 77  ECNT           PICTURE S9999 COMPUTATIONAL VALUE 0.              COLLRESV
00114    011250 77  ERF PICTURE X.                                                   COLLRESV
00115    011300 77  F              PICTURE X.                                        COLLRESV
00116    011400 77  FS  PICTURE S99 COMPUTATIONAL.                                   COLLRESV
00117    011500 77  HPR            PICTURE 9 COMPUTATIONAL-3.                        COLLRESV
00118    011600 77  K   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00119    011700 77  LN  PICTURE S999  COMPUTATIONAL  VALUE 60.                       COLLRESV
00120    011800 77  LN2 PICTURE S999  COMPUTATIONAL  VALUE 56.                       COLLRESV
00121    011900 77  M   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00122    012000 77  N   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00123    012100 77  ONCT     PICTURE S9999 COMPUTATIONAL VALUE 0.                    COLLRESV
00124    012200 77  ONE          PICTURE X.                                          COLLRESV
00125    012300 77  P   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00126    012400 77  Q   PICTURE S9999            COMPUTATIONAL.                      COLLRESV
00127    012500 77  R   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00128    012600 77  RTP     PICTURE S9  COMPUTATIONAL.                               COLLRESV
00129    012700         88  DAILY   VALUE 1.                                         COLLRESV
00130    012800         88  WEEKLY  VALUE 2.                                         COLLRESV
00131    012900 77  S   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00132    013000 77  SAVE    PICTURE X.                                               COLLRESV
00133    013100 77  SVCDIN PICTURE X(80).                                            COLLRESV
00134    013200 77  NSHV  PICTURE XXX  VALUE HIGH-VALUE.                             COLLRESV
00135    013300 77  T   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00136    013400 77  TRKEY          PICTURE S9(5) COMPUTATIONAL.                      COLLRESV
00137    013500 77  W   PICTURE S999             COMPUTATIONAL.                      COLLRESV
00138    013550 77  WACNT          PICTURE S9999 COMPUTATIONAL VALUE 0.              COLLRESV
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00139    013600 77  X    PICTURE S999          COMPUTATIONAL.                COLLRESV
00140    013700 77  Y    PICTURE S999          COMPUTATIONAL.                COLLRESV
00141    013800 77  Z    PICTURE S999          COMPUTATIONAL.                COLLRESV
00142    013900 01  ASSN.                                                    COLLRESV
00143    014000  02  DIN          PICTURE S9 COMPUTATIONAL.                  COLLRESV
00144    014100  02  OUT          PICTURE S9 COMPUTATIONAL.                  COLLRESV
00145    014200  02  WIN          PICTURE S9 COMPUTATIONAL.                  COLLRESV
00146    014300  02  EXT          PICTURE S9 COMPUTATIONAL.                  COLLRESV
00147    014400 01       CAA.                                                COLLRESV
00148    014500  02       CAAF    OCCURS 2000.                               COLLRESV
00149    014600   03       CAUTH  PICTURE X(32).                             COLLRESV
00150    014700   03       CTITL  PICTURE X(5).                              COLLRESV
00151    014800   03       CSEQN  PICTURE 9(6).                              COLLRESV
00152    014810 01  CHD.                                                     COLLRESV
00153    014820  02  FILLER       PICTURE X(23) VALUE 'PUNCHED OUTPUT FOR RUN '.  COLLRESV
00154    014830  02  CRUN         PICTURE 9999.                              COLLRESV
00155    014840  02  FILLER       PICTURE XXXX VALUE ' ON '.                 COLLRESV
00156    014850  02  CDAT         PICTURE X(8).                              COLLRESV
00157    014900 01       CHKDATA.                                            COLLRESV
00158    015100  02        CHKEN   PICTURE XXXX VALUE 'ON  '.                COLLRESV
00159    015200  02        CHKSEQN PICTURE 9(6).                             COLLRESV
00160    015300  02        FILLER  PICTURE X     VALUE SPACE.                COLLRESV
00161    015400  02        CHKAUTH PICTURE X(34).                            COLLRESV
00162    015500  02        FILLER  PICTURE X     VALUE SPACE.                COLLRESV
00163    015600  02        CHKCALN  PICTURE X(30).                           COLLRESV
00164    015700  02        FILLER  PICTURE XXXX VALUE SPACE.                 COLLRESV
00165    016000 01  FILLER.                                                  COLLRESV
00166    016100  02  CTR     PICTURE S9999 COMPUTATIONAL OCCURS 8.           COLLRESV
00167    016200 01  DCRSE.                                                   COLLRESV
00168    016300  02  DNEED        PICTURE 99.                                COLLRESV
00169    016400  02  DCID.                                                   COLLRESV
00170    016500   03  DTERM       PICTURE 999.                               COLLRESV
00171    016600   03  DCRID.                                                 COLLRESV
00172    016700    04  DCRSE      PICTURE X(15).                             COLLRESV
00173    016800    04  DPROF      PICTURE X(15).                             COLLRESV
00174    016900 01  DINREC  PICTURE X(43).                                   COLLRESV
00175    017000 01  DUMCPEF.                                                 COLLRESV
00176    017100  02        DCPE    PICTURE 9    COMPUTATIONAL-3  OCCURS 99.  COLLRESV
00177    017200 01  DUMICEE.                                                 COLLRESV
00178    017300  02        DIC     PICTURE S99  COMPUTATIONAL    OCCURS 13.  COLLRESV
00179    017400 01       FCODED   PICTURE X(48)                              COLLRESV
00180    017500          VALUE 'AUTHTITLEDTNDATECALLLCCNCRSETERMNEEDPROFCOPYORDR'.COLLRESV
00181    017600 01       FCODEF   REDEFINES FCODED.                          COLLRESV
00182    017700  02       FCODE   PICTURE XXXX OCCURS 12.                    COLLRESV
00183    017800 01       FCODED   PICTURE X(32)                              COLLRESV
00184    017900          VALUE 'ENT ON  OFF ADD SUB MOD CHK DEL '.           COLLRESV
00185    018000 01       FCODEF   REDEFINES FCODED.                          COLLRESV
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00186    018100  02        FCODE   PICTURE X(4) OCCURS 8.                                          COLLRESV
00187    018200 01        FFFF.                                                                    COLLRESV
00188    018300  02        FFF.                                                                    COLLRESV
00189    018400    03        MFF     PICTURE X.                                                    COLLRESV
00190    018500    03        CDF     PICTURE X.                                                    COLLRESV
00191    018600    03        PRF     PICTURE X.                                                    COLLRESV
00192    018700    03        PNF     PICTURE X.                                                    COLLRESV
00193    018800    03        PUF     PICTURE X.                                                    COLLRESV
00194    018900    03        T1F     PICTURE X.                                                    COLLRESV
00195    019000    03        T2F     PICTURE X.                                                    COLLRESV
00196    019100    03        T3F     PICTURE X.                                                    COLLRESV
00197    019200    03        T4F     PICTURE X.                                                    COLLRESV
00198    019300  02        FSTF.                                                                   COLLRESV
00199    019400    03        DIF     PICTURE X.                                                    COLLRESV
00200    019500          88  DINOPEN VALUE '0'.                                                    COLLRESV
00201    019600    03        WIF     PICTURE X.                                                    COLLRESV
00202    019700          88  WINOPEN VALUE '0'.                                                    COLLRESV
00203    019800 01        FUNC.                                                                    COLLRESV
00204    019900  02        ICFF.                                                                   COLLRESV
00205    020000    03        ICF     PICTURE S99  COMPUTATIONAL.                                   COLLRESV
00206    020100    03        ICE     PICTURE S99  COMPUTATIONAL      OCCURS 12.                    COLLRESV
00207    020200  02        INFOF.                                                                  COLLRESV
00208    020300    03        INFLO  OCCURS 15.                                                     COLLRESV
00209    020400      04        INFL  PICTURE S99  COMPUTATIONAL.                                   COLLRESV
00210    020500      04        INFO  PICTURE X(76).                                                COLLRESV
00211    020600  02        ICPNC.                                                                  COLLRESV
00212    020700    03        ICFN    OCCURS 25.                                                    COLLRESV
00213    020800      04        ICPF  PICTURE X.                                                    COLLRESV
00214    020900      04        ICPN  PICTURE 99.                                                   COLLRESV
00215    021000  02        ITRB.                                                                   COLLRESV
00216    021100    03        ITRC    PICTURE XXX.                                                  COLLRESV
00217    021200    03        ITRM REDEFINES ITRC    PICTURE 999.                                   COLLRESV
00218    021300    03        FILLER PICTURE 9     VALUE 0.                                         COLLRESV
00219    021400  02        FILLER                  REDEFINES I                                     COLLRESV
00220    021500    03        INBLK  PICTURE X.                                                     COLLRESV
00221    021600    03        INVALTST PICTURE 999.                                                 COLLRESV
00222    021700    03        FILLER                REDEFINES INVALTST.                             COLLRESV
00223    021800      04        INNUM PICTURE 99.                                                   COLLRESV
00224    021900      04        FILLER PICTURE 9.                                                   COLLRESV
00225    022000 01        FUNWORDDUMMY.                                                            COLLRESV
00226    022100  02        FUNWORD.                                                                COLLRESV
00227    022200    03        FUN     PICTURE 9.                                                    COLLRESV
00228    022300    03        FUNS    PICTURE 9     OCCURS 12.                                      COLLRESV
00229    022400  02        FUNWORD2                REDEFINES FUNWORD.                              COLLRESV
00230    022500    03        FUNBIR.                                                               COLLRESV
00231    022600      04        FUN1-2.                                                             COLLRESV
00232    022700        05        FUN1              PICTURE 9.                                      COLLRESV
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00233   022800      05       FUN2                     PICTURE 9.                          COLLRESV
00234   022900     04       FUN3-7                    PICTURE 9(5).                       COLLRESV
00235   023000    03       FUN8-13.                                                       COLLRESV
00236   023100     04       FUN8-11                   PICTURE 9999.                       COLLRESV
00237   023200     04       FUN12-13                  PICTURE 99.                         COLLRESV
00238   023300 01  HOLDIN  PICTURE X(43).                                                 COLLRESV
00239   023400 01  MODBIB.                                                                COLLRESV
00240   023500  02  MAUTH  PICTURE X(32).                                                 COLLRESV
00241   023600  02  MTITL  PICTURE X(5).                                                  COLLRESV
00242   023700 01  OUTREC.                                                                COLLRESV
00243   023800  02  OBIB  PICTURE X(37).                                                  COLLRESV
00244   023900  02  OSEQN  PICTURE 9(6).                                                  COLLRESV
00245   024000 01  PCOPYS.                                                                COLLRESV
00246   024100  02  PCEA.                                                                 COLLRESV
00247   024200   03  PCOPIES  PICTURE X(7).                                               COLLRESV
00248   024300   03  PCPA  OCCURS 20.                                                     COLLRESV
00249   024400    04  PCPEA  PICTURE X.                                                   COLLRESV
00250   024500    04  PCPN   PICTURE 99.                                                  COLLRESV
00251   024600  02  PCEB.                                                                 COLLRESV
00252   024700   03  FILLER  PICTURE X(7).                                                COLLRESV
00253   024800   03  PCPB  OCCURS 20.                                                     COLLRESV
00254   024900    04  FILLER  PICTURE X.                                                  COLLRESV
00255   025000    04  PCPEB   PICTURE X.                                                  COLLRESV
00256   025100    04  FILLER  PICTURE X.                                                  COLLRESV
00257   025200 01  PHEAD.                                                                 COLLRESV
00258   025300  02  FILLER  PICTURE X  VALUE '1'.                                         COLLRESV
00259   025400  02  FILLER  PICTURE X(23)  VALUE SPACE.                                   COLLRESV
00260   025500  02  PUTP PICTURE X(6) VALUE SPACE.                                        COLLRESV
00261   025600  02  FILLER PICTURE X(22) VALUE ' RESERVES WORKLIST OF '.                  COLLRESV
00262   025700  02  HDATE PICTURE X(8).                                                   COLLRESV
00263   025800  02  FILLER PICTURE X(10) VALUE SPACE.                                     COLLRESV
00264   025900  02  HRTYP.                                                                COLLRESV
00265   026000   03  HSUP PICTURE X(24).                                                  COLLRESV
00266   026100   03  HLDATE PICTURE X(8).                                                 COLLRESV
00267   026200  02  FILLER PICTURE X(21) VALUE SPACE.                                     COLLRESV
00268   026300  02  FILLER PICTURE X(5) VALUE 'PAGE '.                                    COLLRESV
00269   026400  02  PAGN PICTURE Z,ZZZ.                                                   COLLRESV
00270   026500 01  PRINTAE.                                                               COLLRESV
00271   026600  02  PRINTS.                                                               COLLRESV
00272   026700   05  PLINE  OCCURS 16.                                                    COLLRESV
00273   026800    10  CCH  PICTURE X.                                                     COLLRESV
00274   026900    10  PRIBE.                                                              COLLRESV
00275   027000     15  FILLER  PICTURE X(17).                                             COLLRESV
00276   027100     15  PCPAP.                                                             COLLRESV
00277   027200      20  PCOPYE   PICTURE X(67).                                           COLLRESV
00278   027300     15  FILLER  PICTURE X(17).                                             COLLRESV
00279   027400    10  PCRSEE  PICTURE X(38).
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027500  02  BIBSTUF  REDEFINES PRINTS.                                   COLLRESV
027600    05  LIN1.                                                      COLLRESV
027700      10  CCH1  PICTURE X.                                         COLLRESV
027800      10  PSEQN  PICTURE 9(6).                                     COLLRESV
027900      10  FILLER  PICTURE X(5).                                    COLLRESV
028000      10  PAUTH  PICTURE X(75).                                    COLLRESV
028100      10  FILLER  PICTURE X(45).                                   COLLRESV
028200    05  LIN2.                                                      COLLRESV
028300      10  CCH2  PICTURE X.                                         COLLRESV
028400      10  FILLER  PICTURE X(15).                                   COLLRESV
028500      10  PTITL  PICTURE X(76).                                    COLLRESV
028600      10  FILLER  PICTURE X(41).                                   COLLRESV
028700    05  LIN3.                                                      COLLRESV
028800      10  CCH3  PICTURE X.                                         COLLRESV
028900      10  FILLER  PICTURE X(15).                                   COLLRESV
029000      10  PEDTN  PICTURE X(10).                                    COLLRESV
029100      10  FILLER  PICTURE X.                                       COLLRESV
029200      10  PDATE  PICTURE X(10).                                    COLLRESV
029300      10  FILLER  PICTURE X.                                       COLLRESV
029400      10  PCALL  PICTURE X(30).                                    COLLRESV
029500      10  FILLER  PICTURE X.                                       COLLRESV
029600      10  PLOCN  PICTURE X(10).                                    COLLRESV
029700 01  PSTUF.                                                        COLLRESV
029800    05  PCPTOTL.                                                   COLLRESV
029900      10  PTOTCOP  PICTURE X(13) VALUE 'TOTAL COPIES '.            COLLRESV
030000      10  PTOTL  PICTURE 99.                                       COLLRESV
030100      10  PORD  PICTURE X(7) VALUE '  ORDR '.                      COLLRESV
030200      10  PORDR  PICTURE 99.                                       COLLRESV
030300 01  PTERMHD.                                                      COLLRESV
030400  02  PTERHD   PICTURE X(5) VALUE 'TERM '.                         COLLRESV
030500  02  PTERM    PICTURE 999.                                        COLLRESV
030600 01  PCRSES.                                                       COLLRESV
030700  05  FILLER   PICTURE XXX  VALUE SPACE.                           COLLRESV
030800  05  PCRSE    PICTURE X(15).                                      COLLRESV
030900  05  FILLER   PICTURE X    VALUE SPACE.                           COLLRESV
031000  05  PPROF    PICTURE X(15).                                      COLLRESV
031100  05  FILLER   PICTURE XX   VALUE SPACE.                           COLLRESV
031200  05  PNEED    PICTURE 99.                                         COLLRESV
031300 01  PTTOTLS.                                                      COLLRESV
031400  05  FILLER   PICTURE X(12)  VALUE SPACE.                         COLLRESV
031500  05  PSHORHD PICTURE X(9)  VALUE 'SHORTAGE '.                     COLLRESV
031600  05  PSHORT  PICTURE 99.                                          COLLRESV
031700  05  PTNEEHD PICTURE X(13)  VALUE '  TOTAL NEED '.                COLLRESV
031800  05  PTNEED  PICTURE 99.                                          COLLRESV
031900 01  PUBHEAD.                                                      COLLRESV
032000  02  FILLER  PICTURE X  VALUE '1'.                                COLLRESV
032100  02  FILLER  PICTURE X(20)  VALUE SPACE.                          COLLRESV
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00327   032200  02  FILLER  PICTURE X(27)  VALUE                          COLLRESV
00328   032300        'PUBLIC RESERVES LIST AS OF '.                      COLLRESV
00329   032400  02  PUDATE  PICTURE X(8).                                 COLLRESV
00330   032500  02  PUSUPP PICTURE X(27)  VALUE SPACE.                    COLLRESV
00331   032600  02  FILLER  PICTURE X(5)  VALUE 'PAGE '.                  COLLRESV
00332   032700  02  PUBPAGE  PICTURE Z77.                                 COLLRESV
00333   032800  02  FILLER  PICTURE X(42) VALUE SPACE.                    COLLRESV
00334   032900 01  PUBLINES.                                              COLLRESV
00335   033000  02  PULIN1.                                               COLLRESV
00336   033100   03  PCI     PICTURE X  VALUE '='.                        COLLRESV
00337   033200   03  FILLER  PICTURE X(10)  VALUE SPACE.                  COLLRESV
00338   033300   03  PUAUTH  PICTURE X(76).                               COLLRESV
00339   033400  02  PULIN2.                                               COLLRESV
00340   033500   03  FILLER  PICTURE X  VALUE SPACE.                      COLLRESV
00341   033600   03  FILLER  PICTURE X(14)  VALUE SPACE.                  COLLRESV
00342   033700   03  PUTITL  PICTURE X(76).                               COLLRESV
00343   033800  02  PULIN3.                                               COLLRESV
00344   033900   03  FILLER  PICTURE X  VALUE SPACE.                      COLLRESV
00345   034000   03  FILLER  PICTURE X(14)  VALUE SPACE.                  COLLRESV
00346   034100   03  PUEDTN  PICTURE X(10).                               COLLRESV
00347   034200   03  FILLER  PICTURE X(5)  VALUE SPACE.                   COLLRESV
00348   034300   03  PUDATN  PICTURE X(10).                               COLLRESV
00349   034400 01  RDTA.                                                  COLLRESV
00350   034500  02  RUNSER           PICTURE 9999.                        COLLRESV
00351   034600  02  FILLER           PICTURE X.                           COLLRESV
00352   034700  02  DATE             PICTURE X(8).                        COLLRESV
00353   034800  02  FILLER           PICTURE X.                           COLLRESV
00354   034900  02  TERMA            PICTURE 999.                         COLLRESV
00355   035000  02  FILLER           PICTURE X.                           COLLRESV
00356   035100  02  LRTP             PICTURE X(7).                        COLLRESV
00357   035200  02  FILLER           PICTURE X.                           COLLRESV
00358   035300  02  FILLER           PICTURE X(5).                        COLLRESV
00359   035400  02  HDIN             PICTURE 9.                           COLLRESV
00360   035500  02  FILLER           PICTURE X(5).                        COLLRESV
00361   035600  02  HOUT             PICTURE 9.                           COLLRESV
00362   035700  02  FILLER           PICTURE X(5).                        COLLRESV
00363   035800  02  HWIN             PICTURE 9.                           COLLRESV
00364   035900  02  FILLER           PICTURE X(5).                        COLLRESV
00365   036000  02  HEXT             PICTURE 9.                           COLLRESV
00366   036100  02  FILLER           PICTURE X,                           COLLRESV
00367   036200  02  FUNSEQ           PICTURE 9(5).                        COLLRESV
00368   036300  02  FUNSEQF  REDEFINES FUNSEQ.                            COLLRESV
00369   036400   03  ASEQN           PICTURE 9   OCCURS 5.                COLLRESV
00370   036500  02  ESEQNE           PICTURE 9;                           COLLRESV
00371   036600  02  FILLER           PICTURE X.                           COLLRESV
00372   036700  02  LDATE            PICTURE X(8).                        COLLRESV
00373   036800 01      SEQNEF.
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00374   036900  02        SEQN                       PICTURE 9(6).                    COLLRESV
00375   037000  02        ASEQNE  REDEFINES SEQN.                                     COLLRESV
00376   037100    03        ASEQND                    PICTURE 9(5).                   COLLRESV
00377   037200    03        ASEQNE                    PICTURE 9.                      COLLRESV
00378   037300 01   SLDATA.                                                           COLLRESV
00379   037400  02  FILLER      PICTURE X(17) VALUE SPACE.                            COLLRESV
00380   037500  02  SLSEQN.                                                           COLLRESV
00381   037600    03  SLFUNSEQ  PICTURE 9(5).                                         COLLRESV
00382   037700    03  SLFSEQNE  PICTURE 9.                                            COLLRESV
00383   037800  02  FILLER      PICTURE X(3) VALUE SPACE.                             COLLRESV
00384   037900  02  SLBIB.                                                            COLLRESV
00385   038000    03  FILLER      PICTURE X(21)                                       COLLRESV
00386   038100            VALUE '  NEW ENTRIES IN RUN '.                              COLLRESV
00387   038200    03  SLFUNSER  PICTURE 9(4).                                         COLLRESV
00388   038300    03  FILLER      PICTURE X(4) VALUE ' ON '.                          COLLRESV
00389   038400    03  SLDATE      PICTURE X(9).                                       COLLRESV
00390   038500    03  FILLER      PICTURE X(3) VALUE SPACE.                           COLLRESV
00391   038600  02  FILLER  REDEFINES SLBIB.                                          COLLRESV
00392   038700    03  SLAUTH      PICTURE X(32).                                      COLLRESV
00393   038800    03  SLATFIL     PICTURE X(3).                                       COLLRESV
00394   038900    03  SLTITL      PICTURE X(5).                                       COLLRESV
00395   039000 01  TERME PICTURE 999.                                                 COLLRESV
00396   039100 01  TERMF REDEFINES TERME.                                             COLLRESV
00397   039200  02  TERMG  PICTURE 99.                                                COLLRESV
00398   039300  02  TERMH  PICTURE 9.                                                 COLLRESV
00399   039400 01  TRMS.                                                              COLLRESV
00400   039500  02  TRM OCCURS 3.                                                     COLLRESV
00401   039600    03  TRA PICTURE 99.                                                 COLLRESV
00402   039700    03  TRB PICTURE 9.                                                  COLLRESV
00403   039710 01  WARDATA.                                                           COLLRESV
00404   039730  02  WATXT.                                                            COLLRESV
00405   039731    03  WATA            PICTURE X(7).                                   COLLRESV
00406   039732    03  WANEED          PICTURE 99.                                     COLLRESV
00407   039733    03  WATB            PICTURE X(16).                                  COLLRESV
00408   039740  02  FILLER            PICTURE X VALUE SPACE.                          COLLRESV
00409   039750  02  WASEQN            PICTURE 9(6).                                   COLLRESV
00410   039760  02  FILLER            PICTURE X VALUE SPACE.                          COLLRESV
00411   039770  02  WACALN            PICTURE X(30).                                  COLLRESV
00412   039780  02  FILLER            PICTURE X VALUE SPACE.                          COLLRESV
00413   039790  02  WAAUTH            PICTURE X(16).                                  COLLRESV
00414   039800 01  WINREC  PICTURE X(43).                                             COLLRESV
00415   039900 PROCEDURE DIVISION.                                                    COLLRESV
00416   040000 INITIALIZATION SECTION.                                                COLLRESV
00417   040100 SETUP.                                                                 COLLRESV
00418   040200       MOVE ALL 'C' TO FFFF.                                            COLLRESV
00419   040300       OPEN INPUT CDIN I-O MASTER-FILE. MOVE '0' TO CDF MFF.            COLLRESV
00420   040400       MOVE 0 TO TPKEY SEQN.
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040500     READ MASTER-FILE INTO RDTA INVALID GO TO ABORT1.                 COLLRESV
040600     DISPLAY 'LAST RUN ' RDTA. ADD 1 TO RUNSER.                       COLLRESV
040700     ENTER LINKAGE. CALL 'DATE' USING DATE. ENTER COBOL.              COLLRESV
040800     MOVE TERMA TO TRM (1) TRM (2) TRM (3) GO TO T123 T231 T312       COLLRESV
040900     DEPENDING TRB (1).                                               COLLRESV
041000 T123. MOVE 2 TO TRB (2) MOVE 3 TO TRB (3) GO TO TEX.                 COLLRESV
041100 T231. MOVE 3 TO TRB (2) MOVE 1 TO TRB (3) ADD 1 TO TRA (3) GO TO     COLLRESV
041200     TEX.                                                             COLLRESV
041300 T312. MOVE 1 TO TRB (2) MOVE 2 TO TRB (3) ADD 1 TO TRA (2) ADD 1     COLLRESV
041400     TO TRA (3).                                                      COLLRESV
041500 TEX. MOVE DATE TO HDATE. READ CDIN END GO TO ABORT2.                 COLLRESV
041600     DISPLAY 'FIRST CARD READ: ' CARDIN.                              COLLRESV
041700     IF CODE NOT = 'RUN=' GO TO ABORT2.                               COLLRESV
041800     IF INRUN NOT = RUNSER DISPLAY                                    COLLRESV
041900     'RUN NUMBER INCORRECT, MUST BE ' RUNSER THEN GO TO CLOSEM.       COLLRESV
042000     IF IRT = ' SUPPL.' MOVE 1 TO RTP GO TO DS.                       COLLRESV
042100     IF IRT = ' MASTER' MOVE 2 TO RTP GO TO WS.                       COLLRESV
042200     IF IRT NOT = ' SETUP ' GO TO ABORT2.                             COLLRESV
042300     MOVE 2 TO RTP. IF IASSN NUMERIC AND IWIN + IOUT = 7 AND          COLLRESV
042400         IDIN + IEXT = 3 NEXT SENTENCE. ELSE GO TO ABORT2.            COLLRESV
042500     MOVE IDIN TO DIN  MOVE IOUT TO OUT                               COLLRESV
042600     MOVE IWIN TO WIN  MOVE IEXT TO EXT  GO TO WOPEN.                 COLLRESV
042700 WS. IF LRTP NOT = ' SUPPL.' AND 'DAILY  ' GO TO WAW.                 COLLRESV
042800     MOVE HDIN TO EXT  MOVE HOUT TO DIN                               COLLRESV
042900     MOVE HWIN TO WIN  MOVE HEXT TO OUT  GO TO WOPEN.                 COLLRESV
043000 WAW.     MOVE HDIN TO EXT  MOVE HOUT TO WIN                          COLLRESV
043100          MOVE HWIN TO OUT  MOVE HEXT TO DIN.                         COLLRESV
043200 WOPEN.  IF WIN + OUT NOT = 7 OR DIN + EXT NOT = 3 GO TO ABORT3.      COLLRESV
043300     SUBTRACT 2 FROM WIN. GO TO WOPEN34 WOPEN43 DEPENDING WIN.        COLLRESV
043400     GO TO ABORT3.                                                    COLLRESV
043500 WOPEN34.    OPEN INPUT TAPE3 OUTPUT TAPE4. GO TO WOPEND.             COLLRESV
043600 WOPEN43.    OPEN INPUT TAPE4 OUTPUT TAPE3.                           COLLRESV
043700 WOPEND. MOVE '0' TO T3F T4F WIF.                                     COLLRESV
043800     GO TO DOPEN12 DOPEN21 DEPENDING DIN. GO TO ABORT3.               COLLRESV
043900 DS. IF LRTP NOT = ' SUPPL.' AND 'DAILY  ' GO TO DAW.                 COLLRESV
044000     MOVE HDIN TO OUT  MOVE HOUT TO DIN                               COLLRESV
044100     MOVE HWIN TO WIN  MOVE HEXT TO EXT.  GO TO DOPEN.                COLLRESV
044200 DAW.     MOVE HDIN TO OUT  MOVE HOUT TO WIN                          COLLRESV
044300          MOVE HWIN TO EXT  MOVE HEXT TO DIN.                         COLLRESV
044400 DOPEN.  IF DIN + OUT NOT = 3 OR WIN + EXT NOT = 7 GO TO ABORT3.      COLLRESV
044500     SUBTRACT 2 FROM WIN GO TO DOPEN12 DOPEN21 DEPENDING DIN.         COLLRESV
044600     GO TO ABORT3.                                                    COLLRESV
044700 DOPEN12.    OPEN INPUT TAPE1 OUTPUT TAPE2. GO TO DOPEND.             COLLRESV
044800 DOPEN21.    OPEN INPUT TAPE2 OUTPUT TAPE1.                           COLLRESV
044900 DOPEND. MOVE '0' TO T1F T2F DIF.  MOVE IRT TO LRTP.                  COLLRESV
045000     IF DAILY  MOVE LDATE TO HLDATE                                   COLLRESV
045100          MOVE 'SUPPLEMENTS WORKLIST OF ' TO HSUP                     COLLRESV
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045200           MOVE ' (SUPPLEMENT)' TO PUSUPP                         COLLRESV
045300       ELSE MOVE 'MASTER' TO PHTP MOVE DATE TO LDATE              COLLRESV
045400           MOVE 'REPLACES ALL PREVIOUS WORKLISTS ' TO HPTYP.      COLLRESV
045500       IF IASSE = ' PUB'                                          COLLRESV
045600           MOVE 0 TO Z  MOVE 1 TO Y. PUBPAGE  MOVE DATE TO PUDATE COLLRESV
045700     .     OPEN OUTPUT PUBLIC-LIST  MOVE '0' TO PUF               COLLRESV
045800           WRITE PUBLN FROM PUBHEAD DISPLAY 'PUBLIC LIST INITIATED'.COLLRESV
045900       MOVE DIN TO HDIN MOVE OUT TO HOUT ADD 2 WIN GIVING HWIN    COLLRESV
046000       MOVE EXT TO HEXT DISPLAY 'THIS RUN ' RDTA.                 COLLRESV
046100       REWRITE MASTER-RECORD FROM RDTA  INVALID GO TO ABORT1.     COLLRESV
046200       MOVE FUNSEQ TO SLFUNSEQ. MOVE FSEQNE TO SLFSEQNE.          COLLRESV
046300       MOVE RUNSER TO SLRUNSER. MOVE DATE TO SLDATE.              COLLRESV
046400       MOVE 1 TO Q.                                               COLLRESV
046500 ZCTRS.  MOVE 0 TO CTR (Q). IF Q < 8 ADD 1 TO Q GO TO ZCTRS.      COLLRESV
046600       MOVE 1 TO Q.                                               COLLRESV
046700 ZDCPF.  MOVE 0 TO DCPF (Q). IF Q < 99 ADD 1 TO Q GO TO ZDCPF.    COLLRESV
046800       MOVE 1 TO Q.                                               COLLRESV
046900 ZDIC.   MOVE 0 TO DIC (Q). IF Q < 13 ADD 1 TO Q GO TO ZDIC.      COLLRESV
047000       MOVE DUMICFE TO ICFE. MOVE SPACE TO SAVE. GO TO NEWCD.     COLLRESV
047100 ABORT1. DISPLAY 'RDTA R/RR/RW FAILED ' TRKEY SEQN, GO TO CLOSEM. COLLRESV
047200 ABORT2. DISPLAY 'RUN CARD INVALID OR MISSING'. GO TO CLOSEM.     COLLRESV
047300 ABORT3. DISPLAY 'OPEN ROUTINE FAILED' MOVE IRT TO LRTP GO TO AB4.COLLRESV
047400 ABORT4. DISPLAY 'FILE SELECT #' FS ' FAILED'.                    COLLRESV
047500 AB4. EXHIBIT NAMED DIN OUT WIN EXT MEF CDF PRF PNF T1F T2F T3F   COLLRESV
047600       T4F DIF WIF.  DISPLAY 'NEXT RUN MUST BE SETUP'.            COLLRESV
047700       MOVE 0 TO TRKEY SEQN READ MASTER-FILE INVALID GO TO ABORT1. COLLRESV
047800       MOVE DIN TO HDIN MOVE OUT TO HOUT ADD 2 TO WIN             COLLRESV
047900       MOVE WIN TO HWIN MOVE EXT TO HEXT.                         COLLRESV
048000       DISPLAY 'ABORTED RUN ' RDTA. MOVE 0 TO HDIN HOUT HWIN HEXT. COLLRESV
048100       REWRITE MASTER-RECORD FROM RDTA INVALID GO TO ABORT1.      COLLRESV
048200       GO TO CLOSEM.                                              COLLRESV
048300 CARD-READ SECTION.                                               COLLRESV
048400 FETCH-FUNCTION. IF CX NOT < 2000 GO TO TOOMANY.                  COLLRESV
048500       MOVE DUMICFE TO ICFE. MOVE SPACE TO AUTH, SAVE.            COLLRESV
048600 FF. GO TO NC. NOTE ALTER TO QT.                                  COLLRESV
048700 TOOMANY. DISPLAY                                                 COLLRESV
048800       '*** DAY LIMIT EXCEEDED. ANY FOLLOWING NOT PROCESSED ***'. COLLRESV
048900       ALTER NC TO PROCEED TO RUNOUT. GO TO FF.                   COLLRESV
049000 RUNOUT. DISPLAY CARDIN. READ CDIN END GO TO QT. GO TO RUNOUT.    COLLRESV
049100 NEWCD.  ADD 1 TO CD. READ CDIN END                               COLLRESV
049200                   ALTER FF TO PROCEED TO QT GO TO BADFORM.       COLLRESV
049300 NC. GO TO ND. NOTE MAY ALTER TO RUNOUT.                          COLLRESV
049400 ND. PERFORM BLNKSCAN VARYING M FROM 76 BY -1 UNTIL M = 0.        COLLRESV
049500     . IF CPDE = '0' GO TO RITFUN.                                COLLRESV
049600       IF CPDE = '4' GO TO KILLFUN.                               COLLRESV
049700       IF CPDE = ' ' SUBTRACT 1 FROM CD GO TO NEWCD.              COLLRESV
049800       GO TO 900.                                                 COLLRESV
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049900 BLNKSCAN.    IF IC (M) NOT = ' ' GO TO LFIELD.                COLLRESV
050000 LFIELD. IF IC (M) = '*'                                       COLLRESV
050100                   DISPLAY 'FIELD DISCARDED: ' CARDIN          COLLRESV
050200                   SUBTRACT 1 FROM CD GO TO NEWCD.             COLLRESV
050300 000. IF CD = 1  PERFORM ETEST VARYING N FROM 1 BY 1 UNTIL N = 9  COLLRESV
050400                THEN IF CPDE = 'SAVE' GO TO SAVIN              COLLRESV
050500                        ELSE DISPLAY 'NOT A VALID HEADER: ', CARDIN  COLLRESV
050600                             MOVE 0 TO CD GO TO NEWCD          COLLRESV
050700          ELSE    PERFORM ETEST VARYING N FROM 1 BY 1 UNTIL N = 13  COLLRESV
050800                  GO TO ENDFUN.                                COLLRESV
050900 ETEST.  IF CPDE = ECODE (N)                                   COLLRESV
051000        MOVE N TO ICE, GO TO ENTIN CHKIN CHKIN DEPENDING N THEN  COLLRESV
051100        IF IBB NOT NUMERIC DISPLAY 'INVALID SEQUENCE NUMBER' GO TO  COLLRESV
051200        DIS-RD-I ELSE MOVE IBB TO SEQN GO TO NEWCD.            COLLRESV
051300 ETEST.  IF CPDE = ECODE (N) AND ICE (N) = 0                   COLLRESV
051400        MOVE IB TO INFO (CD), MOVE M TO INFL (CD),             COLLRESV
051500        MOVE CD TO ICE (N), GO TO NEWCD.                       COLLRESV
051600 ENTIN. ADD 1 TO FUNSEQ MOVE FUNSEQ TO ASEQND. COMPUTE AA =    COLLRESV
051700        ASEQN (2) * ASEQN (4) + ASEQN (1) + ASEQN (3) + ASEQN (5).  COLLRESV
051800        MOVE AA TO ASEQNE ESEQNE.                              COLLRESV
051900 ENT2. MOVE SPACE TO BIB MOVE ZERO TO PR INVENT CRSES NCRSE    COLLRESV
052000        MOVE DUMCPEE TO CPEE.                                  COLLRESV
052100 ENTEX. GO TO NEWCD.                                           COLLRESV
052200 CHKIN.   IF IBB NUMERIC MOVE IBB TO SEQN                      COLLRESV
052300        ELSE DISPLAY 'INVALID SEQUENCE NUMBER: ' CARDIN        COLLRESV
052400             MOVE 0 TO CD GO TO NEWCD.                         COLLRESV
052500        MOVE IBCE TO ITRC. IF INVALTST NUMERIC MOVE IBCN TO N  COLLRESV
052600        ELSE DISPLAY 'COPY NUMBER INCORRECTLY PUNCHED: ' CARDIN  COLLRESV
052700             MOVE 0 TO CD GO TO NEWCD.                         COLLRESV
052800        MOVE CARDIN TO SVCDIN.                                 COLLRESV
052900        READ CDIN END ALTER EE TO PROCEED TO OT. GO TO FUNGOOD.  COLLRESV
053000 SAVIN. MOVE 1 TO ICE. MOVE 'A' TO SAVE.                       COLLRESV
053100        IF IBB NOT NUMERIC GO TO BADSAVESEQN.                  COLLRESV
053200        MOVE IBB TO SEQN. COMPUTE TRKEY = ASEQND / 5.          COLLRESV
053300        READ MASTER-FILE INVALID GO TO BADSAVESEQN.            COLLRESV
053400        IF PR = 0 GO TO ENT2.                                  COLLRESV
053500        DISPLAY 'SEQUENCE NUMBER IN USE: ' CARDIN. GO TO SAVE-ENT.  COLLRESV
053600 BADSAVESEQN.    DISPLAY 'INVALID SEQUENCE NUMBER: ' CARDIN.   COLLRESV
053700 SAVE-ENT.   DISPLAY '    SUBSTITUTING "ENT"'.                 COLLRESV
053800        MOVE SPACE TO SAVE.   GO TO ENTIN.                     COLLRESV
053900 FUNMOVE.    IF ICE (N) > 0 MOVE 1 TO FUNS (N)                 COLLRESV
054000                            ELSE MOVE 0 TO FUNS (N).           COLLRESV
054100 RITFUN. READ CDIN END ALTER EE TO PROCEED TO OT GO TO FUNCHECK.  COLLRESV
054200        IF CPDE = '0' GO TO RITFUN. IF CPDE = '*' GO TO KILLFUN.  COLLRESV
054300 FUNCHECK.   MOVE ICE TO FUN1.                                 COLLRESV
054400        PERFORM FUNMOVE VARYING N FROM 1 BY 1 UNTIL N = 13.    COLLRESV
054500        IF  (FUN1-2 = '11' AND (FUN8-11 = '1111' OR '0000')) OR  COLLRESV
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054600              (FUNWORD = '8000000000000') OR                        COLLRESV
054700              (FUNBIR = '4000000' AND (FUN8-11 = '1111' OR '0000')) OR COLLRESV
054800              (FUNBIR = '5000000' AND (FUN8-11 = '1111' OR '0000'   COLLRESV
054900                  OR '1101'))   OR                                  COLLRESV
055000              (FUNWORD = '7000000000010') OR                        COLLRESV
055100              (FUN1 = '6' AND (FUN2 > '0' OR FUN3-7 > '00000')     COLLRESV
055200                  AND FUN8-13 = '000000')                           COLLRESV
055300          GO TO FUNGOOD.                                            COLLRESV
055400 BADFORM. IF CD > 1 PERFORM ENDFUN THRU PER-DIS. GO TO NO-DIS-RD.   COLLRESV
055500 ENDFUN. DISPLAY                                                    COLLRESV
055600      'THE FOLLOWING IS NOT A VALID FORMAT, AND HAS BEEN REJECTED'. COLLRESV
055700 FENT.   IF ICE = 1 AND SAVE = SPACE SUBTRACT 1 FROM FUNSEQ.        COLLRESV
055800 PER-DIS.    IF ICE = 1  IF SAVE = SPACE DISPLAY '  ' FCODE (1)     COLLRESV
055900                             ELSE DISPLAY '  SAVE' SEQN.            COLLRESV
056000          IF ICE > 1 DISPLAY ' ' FCODE (ICE) SEQN '     ' AUTH.     COLLRESV
056100          PERFORM DISPLAY-CARDS VARYING M FROM 2 BY 1 UNTIL M = 16  COLLRESV
056200                              AFTER N FROM 1 BY 1 UNTIL N = 13.     COLLRESV
056300 DIS-RD-1. DISPLAY '  ' CARDIN. READ CDIN END GO TO OT.             COLLRESV
056400          IF NOT (CRDE = '0' OR '*') GO TO DIS-RD-1. GO TO DIS-RD-2. COLLRESV
056500 KILLFUN. DISPLAY 'FUNCTION DISCARDED' PERFORM FENT THRU PER-DIS.   COLLRESV
056600 DIS-RD-2. DISPLAY '  ' CARDIN. READ CDIN END GO TO OT.             COLLRESV
056700          IF CRDE = '0' OR '*' GO TO DIS-RD-2.                      COLLRESV
056800 NO-DIS-RD. MOVE 1 TO CD GO TO FETCH-FUNCTION.                      COLLRESV
056900 DISPLAY-CARDS. IF ICE (N) = M DISPLAY '  ' FCODE (N) INFO (M).     COLLRESV
057000 FUNGOOD.     MOVE 1 TO CD.                                         COLLRESV
057100 PERFORM FUNCTION SECTION.                                          COLLRESV
057200          IF ICE = 1 GO TO MODIFY. COMPUTE TRKEY = ASEQND / 5.      COLLRESV
057300          READ MASTER-FILE INVALID GO TO INV. IF PR > 0 GO TO MODIFY. COLLRESV
057400 INV.     IF ICE = 2 OR 3                                           COLLRESV
057500               DISPLAY 'INVALID SEQUENCE NUMBER: ' SVCDIN           COLLRESV
057600          ELSE DISPLAY 'INVALID SEQUENCE NUMBER: ' PERFORM PER-DIS. COLLRESV
057700          GO TO FETCH-FUNCTION.                                     COLLRESV
057800 MODIFY. ADD 1 TO CTR (ICE).                                        COLLRESV
058300          IF ICE = 2 GO TO CHKPLUS. IF ICE = 3 GO TO CHKMINUS.      COLLRESV
058400          IF ICE = 8 DISPLAY 'DELETING RECORD ' SEQN ' ' AUTH       COLLRESV
058500               MOVE 0 TO PR MOVE SPACE TO AUTH GO TO RWMR.          COLLRESV
058600          MOVE 0 TO FS. MOVE SPACE TO ERF.                          COLLRESV
058610          IF ICE = 1 OR 6 PERFORM FINDFIELD THRU BB                 COLLRESV
058620               VARYING N FROM 1 BY 1 UNTIL N > 6                    COLLRESV
058630               IF FS > 0 MOVE 'X' TO ERF                            COLLRESV
058640                    DISPLAY FS ' BIBLIOGRAPHIC FIELD(S) TRUNCATED.'. COLLRESV
058700          IF ICE (11) > 0 PERFORM COPYIN THRU COPYEX.               COLLRESV
058800          IF ICE (12) > 0 PERFORM ORDRIN THRU ORDREX.               COLLRESV
058900          IF ICE (7) > 0 PERFORM CRSEIN THRU BR.                    COLLRESV
059000          IF ERF NOT = SPACE PERFORM PER-DIS.                       COLLRESV
059100          PERFORM NEWSHORT VARYING W FROM 1 BY 1 UNTIL W = 4.       COLLRESV
059200 PRFLAG. IF PR NOT = 2 MOVE 1 TO PR. ADD 1 TO CX.                   COLLRESV
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059300     MOVE AUTH TO CAUTH (CX)   MOVE TITL TO CTITL (CX)                COLLRESV
059400     MOVE SEQN TO CSEQN (CX).                                         COLLRESV
059500 WRTO.   IF ICF = 1 AND SAVE = SPACE GO TO ENTR.                      COLLRESV
059600 RWMR. REWRITE MASTER-RECORD INVALID DISPLAY 'REWRITE FAILED '        COLLRESV
059700     TRKEY SEQN PERFORM PER-DIS. GO TO FETCH-FUNCTION.                COLLRESV
059800 ENTR. COMPUTE TRKEY = ASEQNO / 5.                                    COLLRESV
059900     MOVE AUTH TO SVCDIN. WRITE MASTER-RECORD INVALID DISPLAY         COLLRESV
060000     'FILE LIMIT EXCEEDED ' TRKEY SEQN PERFORM FENT THRU PER-DIS      COLLRESV
060100     GO TO FETCH-FUNCTION. READ MASTER-FILE INVALID GO TO MRNW.       COLLRESV
060200     IF AUTH = SVCDIN GO TO FETCH-FUNCTION.                           COLLRESV
060300 MRNW. DISPLAY 'PROBABLE FUNSEQ ERROR, WILL ATTEMPT CORRECTION.       COLLRESV
060400-    'FUNSEQ=' FUNSEQ.                                                COLLRESV
060500 SES. PERFORM ENTIN. COMPUTE TRKEY = ASEQNO / 5.                      COLLRESV
060600     READ MASTER-FILE INVALID GO TO RTWMR.                            COLLRESV
060700     PERFORM PRFLAG. GO TO SES.                                       COLLRESV
060800 RTWMR. DISPLAY 'NEW FUNSEQ=' FUNSEQ '. WILL ATTEMPT REPROCESS'.      COLLRESV
060900     PERFORM ENT2 GO TO PERFORM-FUNCTION.                             COLLRESV
061000 NEWSHORT.   SUBTRACT NCP FROM TNEED (W) GIVING SHORT (W).            COLLRESV
061100     IF SHORT (W) NEGATIVE MOVE 0 TO SHORT (W).                       COLLRESV
061200 FINDFIELD. IF ICF (N) > 0 MOVE ICF (N) TO P ELSE GO TO BB.           COLLRESV
061300     GO TO AUTHS TITLS EDTNS DATES CALNS LOCNS DEPENDING N.           COLLRESV
061400 AUTHS.  MOVE INFO (P) TO AUTH. GO TO BB.                             COLLRESV
061500 TITLS.  MOVE INFO (P) TO TITL. GO TO BB.                             COLLRESV
061600 EDTNS. MOVE INFO (P) TO EDTN. IF INFL (P) > 10 ADD 1 TO FS.          COLLRESV
061700     GO TO BB.                                                        COLLRESV
061800 DATES. MOVE INFO (P) TO DATN. IF INFL (P) > 10 ADD 1 TO FS.          COLLRESV
061900     GO TO BB.                                                        COLLRESV
062000 CALNS. MOVE INFO (P) TO CALN. IF INFL (P) > 30 ADD 1 TO FS.          COLLRESV
062100     GO TO BB.                                                        COLLRESV
062200 LOCNS. MOVE INFO (P) TO LOCN. IF INFL (P) > 10 ADD 1 TO FS.          COLLRESV
062300 BB. EXIT.                                                            COLLRESV
062400 COPYIN. MOVE ICF (11) TO P MOVE INFO (P) TO ICPNO MOVE 0 TO M FS.COLLRESV
062410     IF NCRSE > 0 MOVE 3 TO A MOVE 4 TO B                             COLLRESV
062420     ELSE MOVE 1 TO A MOVE 2 TO B.                                    COLLRESV
062500 NEXTICPN.   ADD 1 TO M. IF M > 25 GO TO COPYEX.                      COLLRESV
062600     MOVE ICPN (M) TO ITRC. IF ITRC = '    ' GO TO NEXTICPN.          COLLRESV
062700     IF INBLK NUMERIC OR INVALTST NOT NUMERIC OR INNUM = '00'         COLLRESV
062800         ADD 1 TO FS GO TO NEXTICPN   ELSE MOVE INNUM TO N.           COLLRESV
062900     IF CPF (N) NOT > 0                                               COLLRESV
063000         IF ICF = 1 OR 4 GO TO NEWCPN                                 COLLRESV
063100         ELSE DISPLAY 'COPY ' ITRC ' NOT FOUND.'                      COLLRESV
063200             ADD 1 TO FS GO TO NEXTICPN.                              COLLRESV
063300     IF ICF = 5 GO TO SAMESUB. IF ICF = 7 GO TO SAMECHK.              COLLRESV
063400 SAMECPN.                                                             COLLRESV
063500     IF INBLK NOT = SPACE  IF (CPF (N) = 1 OR 3 OR 5) ADD 1 TO        COLLRESV
063600     CPF (N) ELSE NEXT SENTENCE ELSE IF (CPF (N) = 2 OR 4 OR 6)       COLLRESV
063700     SUBTRACT 1 FROM CPF (N).                                         COLLRESV
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063800       DISPLAY 'ADDED DUPLICATE COPY ' ITRC '. WARNING ONLY.'           COLLRESV
063900       ADD 1 TO FS GO TO NEXTICPN.                                      COLLRESV
064000 NEWCPN. ADD 1 TO NCP. IF INBLK NOT = SPACE MOVE B TO CPF (N)           COLLRESV
064100       ELSE, MOVE A TO CPF (N). GO TO NEXTICPN.                         COLLRESV
064200 SAMECHK.    IF CPF (N) > 2 SUBTRACT 2 FROM CPF (N) GO TO SAMECHK.COLLRESV
064300       GO TO NEXTICPN.                                                  COLLRESV
064400 SAMESUB.    SUBTRACT 1 FROM NCP MOVE 0 TO CPF (N) GO TO NEXTICPN.COLLRESV
064500 COPYEX. IF FS > 0 MOVE 'X' TO ERF.                                     COLLRESV
064600             DISPLAY FS ' ERRORS IN COPY FIELD. CHECK RESULT.'.         COLLRESV
064700 CHKPLUS.    IF N = 0 DISPLAY 'ZERO COPY ILLEGAL:  ' SVCDIN             COLLRESV
064800       ELSE  IF CPF (N) = 3 OR 4 SUBTRACT 2 FROM CPF (N)                COLLRESV
064900       ELSE  IF CPF (N) > 0 DISPLAY 'NOT FLAGGED PLUS:    ' SVCDIN COLLRESV
065000             ELSE DISPLAY 'CANNOT LOCATE COPY: ' SVCDIN.                COLLRESV
065100 CHP.    IF CPDE NOT = 'ON  ' OR IBB NOT = SEONFF GO TO PREFLAG.        COLLRESV
065200      MOVE IBCF TO ITRC. IF INVALTST NOT NUMERIC GO TO PREFLAG.         COLLRESV
065300      MOVE IBCN TO N MOVE CARDIN TO SVCDIN. ADD 1 TO CTR (2).           COLLRESV
065400      READ CDIN END ALTER FF TO PROCEED TO OT PERFORM CHKPLUS           COLLRESV
065500           GO TO PREFLAG.          GO TO CHKPLUS.                       COLLRESV
065600 CHKMINUS.   IF N = 0 DISPLAY 'ZERO COPY ILLEGAL:  ' SVCDIN             COLLRESV
065700       ELSE  IF CPF (N) > 4 SUBTRACT 4 FROM CPF (N)                     COLLRESV
065800       ELSE  IF CPF (N) > 0 DISPLAY 'NOT FLAGGED MINUS:  ' SVCDIN COLLRESV
065900             ELSE DISPLAY 'CANNOT LOCATE COPY: ' SVCDIN.                COLLRESV
066000 CHM.    IF CPDE NOT = 'OFF ' OR IBB NOT = SEONFF GO TO PREFLAG.        COLLRESV
066100      MOVE IBCF TO ITRC. IF INVALTST NOT NUMERIC GO TO PREFLAG.         COLLRESV
066200      MOVE IBCN TO N MOVE CARDIN TO SVCDIN. ADD 1 TO CTR (3).           COLLRESV
066300      READ CDIN END ALTER FF TO PROCEED TO OT PERFORM CHKMINUS          COLLRESV
066400           GO TO PREFLAG.          GO TO CHKMINUS.                      COLLRESV
066500 CRSEIN. MOVE ICE (8) TO P MOVE INFO (P) TO ITRC.                       COLLRESV
066600      IF ITRM = TRM (1) OR TRM (2) OR TRM (3) MOVE ITRM TO TERME        COLLRESV
066700      ELSE DISPLAY 'TERM NOT ACCEPTABLE, OR INCORRECTLY PUNCHED:'       COLLRESV
066800           GO TO FAIL-BD.                                               COLLRESV
066900      IF ICE (9) = 0 MOVE 0 TO INNUM ELSE MOVE ICE (9) TO P MOVE        COLLRESV
067000      INFO (P) TO ITRC THEN IF INBLK NOT = SPACE OR INVALTST NOT        COLLRESV
067100      NUMERIC DISPLAY 'NEED FIELD IS INCORRECTLY PUNCHED:'              COLLRESV
067200           GO TO FAIL-BD.                                               COLLRESV
067300      MOVE ICE (7) TO P MOVE INFO (P) TO DCRSE.                         COLLRESV
067350      IF INFL (P) > 15 MOVE 'X' TO ERF                                  COLLRESV
067360           DISPLAY 'CRSE FIELD TRUNCATED.'.                             COLLRESV
067400      MOVE ICE (10) TO R MOVE INFO (R) TO DPROF.                        COLLRESV
067450      IF INFL (R) > 15 MOVE 'X' TO ERF                                  COLLRESV
067460           DISPLAY 'PROF FIELD TRUNCATED.'.                             COLLRESV
067500      MOVE TERME TO DTERM. MOVE NCRSE TO O. MOVE NCP TO X.              COLLRESV
067550      MOVE 0 TO N, N, W. MOVE SPACE TO F.                               COLLRESV
067600 TES.     IF N < O ADD 1 TO N                                           COLLRESV
067700           THEN IF DCID = CID (N) GO TO SAMECRSE                        COLLRESV
067800                ELSE GO TO TES.                                         COLLRESV
067900      IF ICE = 5 DISPLAY 'CANNOT LOCATE COURSE:' GO TO FAIL-BD.         COLLRESV
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068000        IF N < 8 ADD 1 TO N                                                 COLLRE
068100            ELSE DISPLAY 'CANNOT ADD ANOTHER COURSE;' GO TO FAIL-BD.        COLLRE
068200        MOVE TERMH TO T. COMPUTE Q = TNEED (T) + INNUM.                     COLLRE
068300        IF Q > 99 GO TO BIGNEED.     MOVE Q TO TNEED (T).                   COLLRE
068400        MOVE INNUM TO DNEED. MOVE DCRSE TO CRSE (N). MOVE N TO NCRSE.COLLRE
068700        IF N > 1 GO TO PLCNT.  MOVE 2 TO PR.                                COLLRE
068750 ONS.       IF M NOT < X GO TO PLEX.  ADD 1 TO W.                           COLLRE
068800        IF W > 99 DISPLAY 'NCP ERR ' SEQN THEN GO TO PLEX.                  COLLRE
068850        MOVE CPF (W) TO Q. IF Q = 0 GO TO ONS. ADD 1 TO M.                  COLLRES
068900        IF Q < 3 ADD 2 TO Q GO TO CPFSET.   MOVE 'X' TO F.                  COLLRES
068950        IF Q > 4 SUBTRACT 2 FROM Q.                                         COLLRES
069000 CPFSET. MOVE Q TO CPF (W).  GO TO ONS.                                     COLLRES
069050 PLCNT.  IF M NOT < X GO TO PLCNEX. ADD 1 TO W.                             COLLRES
069100        IF W > 99 DISPLAY 'NCP ERR ' SEQN THEN GO TO PLCNEX.                COLLRES
069150        MOVE CPF (W) TO Q. IF Q > 0                                         COLLRES
069200            IF Q < 3 SUBTRACT 1 FROM X ELSE ADD 1 TO M.                     COLLRES
069250        GO TO PLCNT.                                                        COLLRES
069300 WAPUN.  IF PNF = 'C' OPEN OUTPUT PNOUT MOVE 'O' TO PNF THEN               COLLRES
069310        MOVE RUNSER TO CRUN MOVE DATE TO CDAT WRITE CARDOUT FROM CHD.COLLRES
069350        MOVE SEQN TO WASEQN MOVE CALN TO WACALN MOVE AUTH TO WAAUTH. COLLRES
069400        WRITE CARDOUT FROM WARDATA ADD 1 TO WACNT.                          COLLRES
069450 WAEX.    GO TO.   NOTE SET BEFORE EACH BRANCH TO WAPUN.                    COLLRESV
069500 PLEX.    IF F NOT = SPACE                                                  COLLRESV
069550             MOVE 'DISCARD OLD ON/OFF CARDS.' TO WATXT                      COLLRESV
069600             ALTER WAEX TO PROCEED TO PLCNEX GO TO WAPUN.                   COLLRESV
069650 PLCNEX. IF INNUM NOT > X MOVE INNUM TO X                                   COLLRESV
069700           . ELSE MOVE 'NEED = ' TO WATA MOVE INNUM TO WANEED               COLLRESV
069710                  MOVE '. POSS. SHORTAGE' TO WATB                           COLLRESV
069750                  ALTER WAEX TO PROCEED TO ONPUN GO TO WAPUN.               COLLRESV
069800 ONPUN.  IF PNF = 'C' OPEN OUTPUT PNOUT MOVE 'O' TO PNF THEN               COLLRESV
069810        MOVE RUNSER TO CRUN MOVE DATE TO CDAT WRITE CARDOUT FROM CHD.COLLRESV
069850        MOVE SEQN TO CHKSEQN  MOVE AUTH TO CHKAUTH                          COLLRESV
069900        MOVE CALN TO CHKCALN.                                               COLLRESV
070000 PUNLP.  IF X NOT > 0 GO TO BD.  WRITE CARDOUT FROM CHKDATA.                COLLRESV
070050        ADD 1 TO ONCT.  SUBTRACT 1 FROM X.  GO TO PUNLP.                    COLLRESV
070200 SAMECRSE.  MOVE TERMH TO T. IF ICF = 5 GO TO SUBCRSE.                      COLLRESV
070300        IF 99 < (INNUM + NEED (N)) OR (INNUM + TNEED (T))                   COLLRESV
070400            GO TO BIGNEED.                                                  COLLRESV
070500        ADD INNUM TO NEED (N), ADD INNUM TO TNEED (T).                      COLLRESV
070600        DISPLAY 'ADDED SAME COURSE, CHECK NEW NEED.' MOVE 'X' TO ERF.COLLRESV
070610        MOVE 'WARNING ADDED SAME COURSE' TO WATXT.                          COLLRESV
070620        ALTER WAEX TO PROCEED TO PLCNT GO TO WAPUN.                         COLLRESV
070700 SUBCRSE.    IF INNUM < 1 GO TO DELCRS.                                     COLLRESV
070800        IF INNUM = NEED (N) GO TO DELCRS.                                   COLLRESV
070900        IF INNUM > NEED (N) GO TO BIGNEED.                                  COLLRESV
071000        SUBTRACT INNUM FROM NEED (N) SUBTRACT INNUM FROM TNEED (T).         COLLRESV
071100        GO TO BD.                                                           COLLRESV
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071200 DELCRS. SUBTRACT NEED (N) FROM TNEED (T).    IF N < NCRSE        COLLRESV
071300     PERFORM CRSDOWNSHUF VARYING W FROM N BY 1 UNTIL X = NCRSE.   COLLRESV
071400     MOVE ZEROS TO CID (NCRSE).                                   COLLRESV
071500     SUBTRACT 1 FROM NCRSE DISPLAY 'DELETING COURSE' GO TO DIS-BD.COLLRESV
071600 CRSDOWNSHUF.    ADD 1 W GIVING X. MOVE CRSE (X) TO CRSE (W).     COLLRESV
071700 BIGNEED.    DISPLAY 'NEED IS TOO LARGE!'.                        COLLRESV
071800 FAIL-BD.    DISPLAY 'COURSE INFORMATION NOT PROCESSED.'.         COLLRESV
071900 DIS-BD. MOVE 'X' TO ERF.                                         COLLRESV
072000 BD. EXIT.                                                        COLLRESV
072100 ORDRIN. MOVE ICE (12) TO P MOVE INFO (P) TO ITRC.                COLLRESV
072200     IF INBLK NUMERIC OR INVALTST NOT NUMERIC GO TO ORDRER.       COLLRESV
072300     IF ICE = 5 IF INNUM NOT > ORDR SUBTRACT INNUM FROM ORDR      COLLRESV
072400     ELSE GO TO ORDRER ELSE IF INNUM + ORDR < 100 ADD INNUM TO    COLLRESV
072500     ORDR ELSE GO TO ORDRER.                                      COLLRESV
072600 ORDREX. EXIT.                                                    COLLRESV
072700 ORDRER. DISPLAY 'ORDR FIELD IS INCORRECTLY PUNCHED OR VALUE IS UNCOLLRESV
072800-    'ACCEPTABLE.'. MOVE 'X' TO ERF GO TO ORDREX.                 COLLRESV
072900 DAYWEEK SECTION.                                                 COLLRESV
073000 QT. CLOSE CDIN MOVE 'C' TO CDF.                                  COLLRESV
073100     DISPLAY '*** END OF INPUT PHASE ' RDTA.                      COLLRESV
073200     DISPLAY CX ' RECORDS REFERENCED.'                            COLLRESV
073300     IF PNF = 'O' CLOSE PNOUT DISPLAY                             COLLRESV
073350          ONCT ' "ON" CARDS. ' WACNT ' WARNINGS PRODUCED.'        COLLRESV
073400     ELSE DISPLAY 'NO PUNCHED OUTPUT.'.                           COLLRESV
073500     DISPLAY 'TRANSACTION COUNT:'.  MOVE 1 TO Q.                  COLLRESV
073600 DCTRS.  DISPLAY '   ', FCODE (Q), ' = ', CTR (Q).                COLLRESV
073700     IF Q < 8 ADD 1 TO Q GO TO DCTRS.                             COLLRESV
073800     COMPUTE Q = CTR (1) + CTR (2) + CTR (3) + CTR (4) + CTR (5)  COLLRESV
073900     + CTR (6) + CTR (7) + CTR (8).  DISPLAY ' TOTAL = ' Q.       COLLRESV
074000     MOVE 0 TO TRKEY SEQN READ MASTER-FILE INVALID GO TO ABORT1.  COLLRESV
074100     REWRITE MASTER-RECORD FROM RDTA INVALID GO TO ABORT1.        COLLRESV
074200     OPEN OUTPUT SEQNLIST.                                        COLLRESV
074300     WRITE SLREC FROM SLDATA.   MOVE SPACE TO SLATFIL.            COLLRESV
074400     MOVE SPACE TO SLREC.  WRITE SLREC.                           COLLRESV
074500     MOVE 0 TO W.   GO TO SLC.                                    COLLRESV
074600 SLLP.   IF CSEQN (W) > SLSEQN                                    COLLRESV
074700             MOVE CAUTH (W) TO SLAUTH MOVE CTITL (W) TO SLTITL    COLLRESV
074800             MOVE CSEQN (W) TO SLSEQN  WRITE SLREC FROM SLDATA.   COLLRESV
074900 SLC.    IF W < CX ADD 1 TO W GO TO SLLP.                         COLLRESV
075000     MOVE 'END OF NEW ENTRIES' TO SLBIB.                          COLLRESV
075100     MOVE SPACE TO SLSEQN.  WRITE SLREC FROM SLDATA.              COLLRESV
075200     CLOSE SEQNLIST.                                              COLLRESV
075300     OPEN OUTPUT PRINT-FILE MOVE 'O' TO PRF. MOVE 0 TO W T.       COLLRESV
075400     MOVE 1 TO K.                                                 COLLRESV
075500     MOVE SPACE TO PRINTS PERFORM HEAD.                           COLLRESV
075600     IF DAILY ALTER WEEK TO PROCEED TO MVH GO TO NOWIN.           COLLRESV
075700     ALTER WEEK TO PROCEED TO MERGE. GO TO 2WIN3 2WIN4 DEPENDING  COLLRESV
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00797   075800      WIN. MOVE 2 TO FS GO TO ABORT4.                                       COLLRESV
00798   075900 2WIN3. READ TAPE3 INTO WINREC END CLOSE TAPE3 MOVE 'C'                      COLLRESV
00799   076000      TO T3F GO TO 2WINE. GO TO 2WINR.                                      COLLRESV
00800   076100 2WIN4. READ TAPE4 INTO WINREC END CLOSE TAPE4 MOVE 'C'                      COLLRESV
00801   076200      TO T4F GO TO 2WINE. GO TO 2WINR.                                      COLLRESV
00802   076300 2WINE. MOVE 'C' TO WIF ALTER WEEK TO PROCEED TO MVH.                        COLLRESV
00803   076400 2WINR. EXIT.                                                               COLLRESV
00804   076500 NOWIN. GO TO 3DIN1 3DIN2 DEPENDING DIN MOVE 3 TO FS GO TO ABORT4.COLLRESV
00805   076600 3DIN1. READ TAPE1 INTO DINREC END CLOSE TAPE1 MOVE 'C' TO T1F              COLLRESV
00806   076700      GO TO 3DINE. GO TO 3DINR.                                             COLLRESV
00807   076800 3DIN2. READ TAPE2 INTO DINREC END CLOSE TAPE2 MOVE 'C' TO T2F              COLLRESV
00808   076900      GO TO 3DINE. GO TO 3DINR.                                             COLLRESV
00809   077000 3DINE. MOVE NSHV TO DINREC MOVE 'C' TO DIF.                                COLLRESV
00810   077100 3DINR. EXIT.                                                               COLLRESV
00811   077200 DSCAN. MOVE DINREC TO HOLDIN. PERFORM CSCAN THRU CSEXIT                     COLLRESV
00812   077300      VARYING Q FROM 1 BY 1 UNTIL Q > CX.                                   COLLRESV
00813   077400      IF ECNT > 0 MOVE CAAF (CX) TO CAAF (ECNT)                              COLLRESV
00814   077500          SUBTRACT 1 FROM CX MOVE 0 TO ECNT GO TO WEEK.                     COLLRESV
00815   077600      IF DINOPEN GO TO 4DIN1 4DIN2 DEPENDING DIN MOVE 4 TO FS               COLLRESV
00816   077700      GO TO ABORT4. GO TO WEEK.                                             COLLRESV
00817   077800 4DIN1. READ TAPE1 INTO DINREC END CLOSE TAPE1 MOVE 'C' TO T1F              COLLRESV
00818   077900      GO TO 4DINE. GO TO 4DINR.                                             COLLRESV
00819   078000 4DIN2. READ TAPE2 INTO DINREC END CLOSE TAPE2 MOVE 'C' TO T2F              COLLRESV
00820   078100      GO TO 4DINE. GO TO 4DINR.                                             COLLRESV
00821   078200 4DINE. MOVE NSHV TO DINREC. MOVE 'C' TO DIF.                               COLLRESV
00822   078300 4DINR. EXIT.                                                               COLLRESV
00823   078400 WEEK.   GO TO. NOTE MERGE OR MVH.                                          COLLRESV
00824   078500 WKRD. IF WINOPEN GO TO 5WIN3 5WIN4 DEPENDING WIN                           COLLRESV
00825   078600      MOVE 5 TO FS GO TO ABORT4. GO TO MVH.                                 COLLRESV
00826   078700 5WIN3. READ TAPE3 INTO WINREC END CLOSE TAPE3 MOVE 'C' TO T3F              COLLRESV
00827   078800      GO TO 5WINE. GO TO 5WINR.                                             COLLRESV
00828   078900 5WIN4. READ TAPE4 INTO WINREC END CLOSE TAPE4 MOVE 'C' TO T4F              COLLRESV
00829   079000      GO TO 5WINE. GO TO 5WINR.                                             COLLRESV
00830   079100 5WINE. MOVE 'C' TO WIF. ALTER WEEK TO PROCEED TO MVH. GO TO MVH. COLLRESV
00831   079200 5WINR. EXIT.                                                               COLLRESV
00832   079300 MERGE.   IF WINREC < HOLDIN GO TO MVW.                                     COLLRESV
00833   079400          IF WINREC > HOLDIN GO TO MVH.                                     COLLRESV
00834   079500      NOTE WINREC = HOLDIN.  GO TO WKRD.                                    COLLRESV
00835   079600 MVW. MOVE WINREC TO OUTREC. MOVE 2 TO S. GO TO PRINTOUT.                   COLLRESV
00836   079700 MVH. IF HOLDIN = NSHV GO TO ALLDONE.  MOVE HOLDIN TO OUTREC.               COLLRESV
00837   079800      MOVE 1 TO S.                                                          COLLRESV
00838   079900 PRINTOUT. MOVE DSEON TO SEON COMPUTE TRKEY = ASEOND / 5.                   COLLRESV
00839   080000      READ MASTER-FILE INVALID ADD 1 TO W DISPLAY OUTREC                    COLLRESV
00840   080100      ' READ FAILURE #' W GO TO PRINTEXIT.                                  COLLRESV
00841   080200      IF PP = 0 GO TO PRINTEXIT.                                            COLLRESV
00842   080300      MOVE AUTH TO MAUTH  MOVE TITL TO MTITL.                               COLLRESV
00843   080400      IF MODBIB NOT = OBIB DISPLAY                                          COLLRESV
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080500            'MOD AUTH/TITL ' SEQN '  WAS: ' OBIB '  NOW: ' MODBIB    COLLRESV
080600             GO TO PRINTEXIT.                                        COLLRESV
080700         MOVE PR TO HPR. IF DAILY GO TO NPRC.                        COLLRESV
080800         IF PR = 2 PERFORM COPOUT VARYING Q FROM 1 BY 1 UNTIL Q = 100 COLLRESV
080900           MOVE 1 TO PR. IF PR = 1 MOVE 3 TO PR. IF PR = 3 AND NCRSE COLLRESV
081000           = 0 MOVE 4 TO PR.                                         COLLRESV
081100         NOTE IF PR IS CHANGED TO 4, SHOULD GO TO PRINTIT.           COLLRESV
081200 NPRC. GO TO 6OUT1 6OUT2 6OUT3 6OUT4 DEPENDING OUT. MOVE 6 TO FS     COLLRESV
081300         GO TO ABORT4.                                               COLLRESV
081400 6OUT1. WRITE TREC1 FROM OUTREC. GO TO 6OUTW.                        COLLRESV
081500 6OUT2. WRITE TREC2 FROM OUTREC. GO TO 6OUTW.                        COLLRESV
081600 6OUT3. WRITE TREC3 FROM OUTREC. GO TO 6OUTW.                        COLLRESV
081700 6OUT4. WRITE TREC4 FROM OUTREC.                                     COLLRESV
081800 6OUTW. EXIT.                                                        COLLRESV
081900 PRINTIT.                                                            COLLRESV
082000         MOVE SEQN TO PSEQN MOVE AUTH TO PAUTH MOVE TITL TO PTITL    COLLRESV
082100         MOVE EDTN TO PEDTN MOVE DATN TO PDATE MOVE CALN TO PCALL   COLLRESV
082200         MOVE LOCN TO PLOCN MOVE '0' TO CCH1. MOVE 4 TO K MOVE 1 TO M.COLLRESV
082300         MOVE SPACES TO PCOPYS, F, ONE.                              COLLRESV
082400         MOVE NCP TO N   MOVE 0 TO M, P, R.                          COLLRESV
082500 CPFIND. IF M NOT < N  IF M > 0 GO TO FLG ELSE GO TO CPTOTL.         COLLRESV
082600         IF P > 98 DISPLAY 'NCP ERR ' OUTREC ' TELL JIM***' GO TO FLG.COLLRESV
082700         ADD 1 TO P. MOVE CPF (P) TO Q.                              COLLRESV
082800         IF Q > 0 ADD 1 TO M MOVE P TO PCPN (M)                      COLLRESV
082900         ELSE GO TO CPFIND.                                          COLLRESV
083000         IF Q = 1 OR 3 OR 5  NEXT SENTENCE                           COLLRESV
083100         ELSE MOVE '#' TO PCPFA (M)                                  COLLRESV
083200         IF Q > 2 MOVE 'X' TO F                                      COLLRESV
083300         THEN IF Q < 5  MOVE '+' TO PCPFB (M)                        COLLRESV
083400                 ELSE       MOVE '-' TO PCPFB (M)                    COLLRESV
083500         ELSE MOVE 'X' TO ONE.                                       COLLRESV
083600         IF M < 20 GO TO CPFIND.                                     COLLRESV
083700 FLG.       IF K = 4 MOVE 'COPIES' TO PCOPIES.                       COLLRESV
083800         MOVE PCFA TO PCOPYF (K)  ADD 1 TO K.                        COLLRESV
083900         IF F = 'X' MOVE SPACE TO F                                  COLLRESV
084000                 MOVE PCFB TO PCOPYF (K)  ADD 1 TO K.                COLLRESV
084100         MOVE 0 TO M.  SUBTRACT 20 FROM N.                           COLLRESV
084200         MOVE SPACES TO PCOPYS  GO TO CPFIND.                        COLLRESV
084300 CPTOTL. MOVE NCP TO PTOTL MOVE ORDR TO PORDR MOVE PCPTOTL TO         COLLRESV
084400         PCPAR (K) MOVE 1 TO Q. MOVE 0 TO M. MOVE SPACE TO CRF.     COLLRESV
084500 PCS. MOVE TRM (Q) TO TERMF MOVE SPACE TO F MOVE TERMF TO PTERM.     COLLRESV
084600         ADD 1 TO M MOVE PTERMHD TO PCRSEF (M). MOVE NCRSE TO R.     COLLRESV
084700         PERFORM PCRS VARYING P FROM 1 BY 1 UNTIL P > R.             COLLRESV
084800         IF F = 'X'  MOVE 'X' TO CRF                                 COLLRESV
084900                 MOVE TNEED (TERMH) TO PTNEED                        COLLRESV
085000                 MOVE SHORT (TERMH) TO PSHORT                        COLLRESV
085100                 ADD 1 TO M MOVE PTTOTLS TO PCRSEF (M)               COLLRESV
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00891   085200       ELSE MOVE SPACE TO PCRSEF (M) SUBTRACT 1 FROM M.            COLLRESV
00892   085300       ADD 1 TO Q  IF Q < 4 GO TO PCS.                             COLLRESV
00893   085400 BLKBIB. IF K < M ADD 1 TO K MOVE SPACE TO PRIBF (K) GO TO BLKBIB.COLLRESV
00894   085500 BLKCP. IF M < K ADD 1 TO M MOVE SPACE TO PCRSEF (M) GO TO BLKCP. COLLRESV
00895   085600       MOVE 1 TO K ADD 1 TO X. IF M NOT < (LN - X) PERFORM HEAD.   COLLRESV
00896   085700 PRINTEN. IF K > M GO TO PRINTED. WRITE PRTLN FROM PLINE (K).      COLLRESV
00897   085800       ADD 1 TO K ADD 1 TO X GO TO PRINTEN.                        COLLRESV
00898   085900 PRINTED. IF PUF = '0' AND CRF = 'X' AND PNF = 'X'                 COLLRESV
00899   086000           NEXT SENTENCE      ELSE GO TO PRINTED2.                 COLLRESV
00900   086100             MOVE AUTH TO PUAUTH MOVE TITL TO PUTITL MOVE EDTN TO  COLLRESV
00901   086200       PUEDTN MOVE DATN TO PUDATN. IF Z > LN2 ADD 1 TO Y MOVE Y TO COLLRESV
00902   086300       PUBPAGE WRITE PUBLN FROM PUBHEAD MOVE 0 TO Z MOVE '-' TO PCI.COLLRESV
00903   086400       WRITE PUBLN FROM PULIN1 WRITE PUBLN FROM PULIN2 WRITE PUBLN COLLRESV
00904   086500       FROM PULIN3. ADD 3 TO Z MOVE SPACE TO PCI.                  COLLRESV
00905   086600 PRINTED2. IF PR NOT = HPR REWRITE MASTER-RECORD INVALID DISPLAY   COLLRESV
00906   086700       'REWRITE FAILED ' OUTREC.                                   COLLRESV
00907   086800 PRINTEXIT. GO TO DSCAN WKRD DEPENDING S.                          COLLRESV
00908   086900 HEAD. ADD 1 TO T MOVE T TO PAGN MOVE 0 TO X. WRITE PRTLN FROM     COLLRESV
00909   087000       PHEAD. MOVE '0' TO CCH (K).                                 COLLRESV
00910   087100 COPOUT. IF CPF (Q) > 2 GO TO NPSC.                                COLLRESV
00911   087200 CSCAN. EXIT.                                                      COLLRESV
00912   087300 CS2. IF CAAF (O) > HOLDIN GO TO CSEXIT.                           COLLRESV
00913   087400        IF CAAF (O) < HOLDIN MOVE CAAF (O) TO HOLDIN               COLLRESV
00914   087500             MOVE O TO ECNT GO TO CSEXIT.                          COLLRESV
00915   087600       IF CX NOT < 0 MOVE CAAF (CX) TO CAAF (O)                    COLLRESV
00916   087700            SUBTRACT 1 FROM CX GO TO CS2.                          COLLRESV
00917   087800 CSEXIT. EXIT.                                                     COLLRESV
00918   087900 PCRS. IF TERM (P) = TERME MOVE 'X' TO F MOVE CRSE (P) TO PCRSE    COLLRESV
00919   088000       MOVE PEDE (P) TO PCRDE MOVE NEED (P) TO PNEED ADD 1 TO M    COLLRESV
00920   088100       MOVE PCRSES TO PCRSEF (M).                                  COLLRESV
00921   088200 ALLDONE. DISPLAY '*** END OF OUTPUT PHASE.'.                      COLLRESV
00922   088300       IF W > 0 DISPLAY W ' READ FAILURES ON MASTER FILE.'.        COLLRESV
00923   088400 CLOSEM.                                                           COLLRESV
00924   088500       IF T1F = '0' CLOSE TAPE1.                                   COLLRESV
00925   088600       IF T2F = '0' CLOSE TAPE2.                                   COLLRESV
00926   088700       IF T3F = '0' CLOSE TAPE3.                                   COLLRESV
00927   088800       IF T4F = '0' CLOSE TAPE4.                                   COLLRESV
00928   088900       IF MFF = '0' CLOSE MASTER-FILE.                             COLLRESV
00929   089000       IF CDF = '0' CLOSE COIN.                                    COLLRESV
00930   089100       IF PFF = '0' MOVE '-END OF WORKLIST.' TO PRTLN WRITE PRTLN  COLLRESV
00931   089200          CLOSE PRINT-FILE.                                        COLLRESV
00932   089300       IF PUF = '0' MOVE '-            END OF PUBLIC LIST.' TO PUBLN COLLRESV
00933   089400           WRITE PUBLN CLOSE PUBLIC-LIST                           COLLRESV
00934   089500           DISPLAY 'PUBLIC LIST PRODUCED.'.                        COLLRESV
00935   089600       DISPLAY 'FILES CLOSED: END OF JOB.'.  STOP RUN.             COLLRESV
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 LEVEL 1JAN67                                          COBOL F

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 00001    000100 IDENTIFICATION DIVISION.
 00002    000200 PROGRAM-ID. 'COLLTERM'.
 00003    000300 AUTHOR. H.J.HETLAND.
 00004    000400 ENVIRONMENT DIVISION.
 00005    000500 INPUT-OUTPUT SECTION.
 00006    000600 FILE-CONTROL.
 00007    000700     SELECT MASTER ASSIGN 'MASTER' DIRECT-ACCESS
 00008    000800     ORGANIZATION DIRECT  ACCESS RANDOM
 00009    000900     SYMBOLIC SEQN  ACTUAL TRKEY.
 00010    001000     SELECT HYSTERICAL  ASSIGN 'HYSTERIC' UTILITY.
 00011    001100     SELECT MINUSFILE ASSIGN 'OFFCARDS' UTILITY.
 00012    001200 I-O-CONTROL.
 00013    001300     APPLY RESTRICTED SEARCH 1 ON MASTER.
 00014    001400 DATA DIVISION.
 00015    001500 FILE SECTION.
 00016    001600 FD  MASTER
 00017    001700     RECORDING F LABEL RECORD STANDARD DATA RECORD MASTREC.
 00018    001800 01  MASTREC.
 00019    001900  02  PR       PICTURE 9  COMPUTATIONAL-3.
 00020    002000  02  BIB.
 00021    002100   03  AUTH         PICTURE X(76).
 00022    002200   03  TITL         PICTURE X(76).
 00023    002300   03  EDTN         PICTURE X(10).
 00024    002400   03  DATN         PICTURE X(10).
 00025    002500   03  CALN         PICTURE X(30).
 00026    002600   03  LOCN         PICTURE X(10).
 00027    002700  02  INVENT.
 00028    002800   03  ORDR         PICTURE 99.
 00029    002900   03  NCP          PICTURE 99.
 00030    003000  02  CPFF.
 00031    003100   03  CPF          PICTURE 9  COMPUTATIONAL-3  OCCURS 99.
 00032    003200  02  CRSES.
 00033    003300   03  NCRSE        PICTURE 99  COMPUTATIONAL-3.
 00034    003400   03  TNEED        PICTURE 99  OCCURS 3.
 00035    003500   03  SHORT        PICTURE S99  OCCURS 3.
 00036    003600   03  CRSF         OCCURS 8.
 00037    003700    04  NEED        PICTURE 99.
 00038    003800    04  CID.
 00039    003900     05  TERM.
 00040    004000      06  FILLER PICTURE 99.
 00041    004100      06  TERMB  PICTURE 9.
 00042    004200     05  CRID.
 00043    004300      06  CRSE   PICTURE X(15).
 00044    004400      06  PROF   PICTURE X(15).
```

COLLTERM 1

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00045   004500 FD  HYSTERICAL  RECORDING F  BLOCK CONTAINS 20 RECORDS
00046   004600         LABEL RECORD STANDARD  DATA RECORD HYSTREC.
00047   004700 01  HYSTREC.
00048   004800  02  HSEQN        PICTURE X(6).
00049   004900  02  HCRSF.
00050   005000   03  HNEED       PICTURE 99.
00051   005100   03  HTERM       PICTURE 999.
00052   005200   03  HCRID.
00053   005300    04  HCRSE      PICTURE X(15).
00054   005400    04  HPROF      PICTURE X(15).
00055   005500 FD  MINUSFILE
00056   005600         BLOCK 100 RECORDS
00057   005700         RECORDING F LABEL RECORD STANDARD DATA RECORD CHKCD.
00058   005800 01  CHKCD  PICTURE X(80).
00059   005900 WORKING-STORAGE SECTION.
00060   006000 77  A          PICTURE S9999  COMPUTATIONAL.
00061   006100 77  B          PICTURE S9999  COMPUTATIONAL.
00062   006200 77  C          PICTURE S9999  COMPUTATIONAL.
00063   006300 77  D          PICTURE S9999  COMPUTATIONAL.
00064   006400 77  DELCNT          PICTURE S9(5)  COMPUTATIONAL  VALUE 0.
00065   006500 77  DELH            PICTURE S9(5)  COMPUTATIONAL.
00066   006600 77  DUM             PICTURE 999.
00067   006700 77  GENSEQN         PICTURE S9(5) COMPUTATIONAL.
00068   006800 77  MAXSEQN         PICTURE S9(5)  COMPUTATIONAL.
00069   006900 77  MINUSCNT        PICTURE S9(7)  COMPUTATIONAL  VALUE 0.
00070   007000 77  NEWTERM         PICTURE XXX.
00071   007100 77  NUTERM  REDEFINES NEWTERM  PICTURE 999.
00072   007200 77  TIDELCNT        PICTURE S9(5)  COMPUTATIONAL  VALUE 0.
00073   007300 77  TRKEY           PICTURE S9(5)  COMPUTATIONAL.
00074   007400 01  CHKDTA.
00075   007500  02  FILLER         PICTURE XXXX  VALUE 'OFF '.
00076   007600  02  CHKSEQN        PICTURE X(6).
00077   007700  02  FILLER         PICTURE X  VALUE SPACE.
00078   007800  02  CHKAUTH        PICTURE X(34).
00079   007900  02  FILLER         PICTURE X  VALUE SPACE.
00080   008000  02  CHKCALN        PICTURE X(30).
00081   008100  02  FILLER         PICTURE XX  VALUE SPACE.
00082   008200  02  CHKCPY         PICTURE 99.
00083   008300 01  RDTA.
00084   008400  02  RUNSER  PICTURE 9999.
00085   008500  02  FILLER  PICTURE X.
00086   008600  02  DATE  PICTURE X(8).
00087   008700  02  FILLER  PICTURE X.
00088   008800  02  TERMA  PICTURE 999.
00089   008900  02  FILLER  PICTURE X.
00090   009000  02  LRTP  PICTURE X(7).
00091   009100  02  FILLER  PICTURE X.
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00092   009200  02  FILLER  PICTURE X(5).
00093   009300  02  HDIN  PICTURE 9.
00094   009400  02  FILLER  PICTURE X(5).
00095   009500  02  HOUT  PICTURE 9.
00096   009600  02  FILLER  PICTURE X(5).
00097   009700  02  HWIN  PICTURE 9.
00098   009800  02  FILLER  PICTURE X(5).
00099   009900  02  HEXT  PICTURE 9.
00100   010000  02  FILLER  PICTURE X.
00101   010100  02  FUNSEQ  PICTURE 9(5).
00102   010200  02  FSEQNE  PICTURE 9.
00103   010300  02  FILLER  PICTURE X.
00104   010400  02  LDATE  PICTURE X(8).
00105   010500 01  SEQN.
00106   010600  02  FSEQN  PICTURE 9(5).
00107   010700  02  FILLER      REDEFINES FSEQN.
00108   010800   03  D1      PICTURE 9.
00109   010900   03  D2      PICTURE 9.
00110   011000   03  D3      PICTURE 9.
00111   011100   03  D4      PICTURE 9.
00112   011200   03  D5      PICTURE 9.
00113   011300  02  D6       PICTURE 9.
00114   011400 01  FILLER.
00115   011500  02  B1       PICTURE S9  COMPUTATIONAL.
00116   011600  02  B2       PICTURE S9  COMPUTATIONAL.
00117   011700  02  B3       PICTURE S9  COMPUTATIONAL.
00118   011800  02  B4       PICTURE S9  COMPUTATIONAL.
00119   011900  02  B5       PICTURE S9  COMPUTATIONAL.
00120   012000 01  FILLER.
00121   012100  02  NEWNEED    PICTURE S99  COMPUTATIONAL  OCCURS 3.
00122   012200 PROCEDURE DIVISION.
00123   012300      ACCEPT NEWTERM.  EXHIBIT NAMED NEWTERM.
00124   012400      IF NEWTERM NOT NUMERIC DISPLAY
00125   012500      'NEW TERM INCORRECTLY PUNCHED.' THEN GO TO ABORT2.
00126   012600      OPEN I-O MASTER.
00127   012700      MOVE ZERO TO SEQN, TRKEY.
00128   012800      READ MASTER INTO RDTA
00129   012900          INVALID EXHIBIT NAMED 'RDTA READ FAILED.' TRKEY SEQN
00130   013000              THEN GO TO ABORT1.
00131   013100      IF NEWTERM NOT > TERMA
00132   013200          DISPLAY 'CURRENT TERM IS ' TERMA
00133   013300          '. NEW TERM MUST BE GREATER.'
00134   013400          THEN GO TO ABORT1.
00135   013500      DISPLAY 'PRESENT FILE STATUS: ' RDTA.
00136   013600      OPEN OUTPUT HYSTERICAL, MINUSFILE.
00137   013700      MOVE FUNSEQ TO MAXSEQN.
00138   013800      MOVE ZERO TO GENSEQN.
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COLLTERM 3

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00139    013900 LP1.
00140    014000        IF GENSEON < MAXSEON ADD 1 TO GENSEON
00141    014100             ELSE GO TO ENDED.
00142    014200        MOVE GENSEON TO FSEON.  MOVE D1 TO B1 MOVE D2 TO B2
00143    014300             MOVE D3 TO B3 MOVE D4 TO B4 MOVE D5 TO B5.
00144    014400        COMPUTE DUM = B2 * B4 + B1 + B3 + B5.  MOVE DUM TO D6.
00145    014500        COMPUTE TRKEY = GENSEON / 5.
00146    014600        READ MASTER   INVALID EXHIBIT NAMED
00147    014700             'READ FAILURE' TRKEY SEON   THEN GO TO LP1.
00148    014800        IF PR = 0 GO TO LP1.
00149    014900        MOVE ZERO TO NEWNEED (1) NEWNEED (2) NEWNEED (3).
00150    015000        MOVE DELCNT TO DELH.
00151    015100        MOVE 1 TO A MOVE 0 TO B MOVE NCRSE TO C.
00152                  IF C = 0 GO TO LP1.  NOTE NO PROCESS IF NO COURSES.
00153    015200 LP2.        IF A > C OR B GO TO P2.
00154    015300        IF TERM (A) NOT < NEWTERM
00155    015400             ADD 1 TO B
00156    015500             MOVE CRSE (A) TO CRSE (B)
00157    015600             MOVE TERMB (B) TO D  ADD NEED (B) TO NEWNEED (D)
00158    015700        ELSE
00159    015800             MOVE CRSF (A) TO HCRSF
00160    015900             ADD 1 TO DELCNT
00161    016000             THEN IF HCRID NOT = SPACE
00162    016100                  MOVE SEON TO HSEON  WRITE HYSTREC.
00163    016200        ADD 1 TO A GO TO LP2.
00164    016300 P2.  MOVE B TO NCRSE.  MOVE NEWNEED (1) TO TNEED (1)
00165    016400        MOVE NEWNEED (2) TO TNEED (2)  MOVE NEWNEED (3) TO TNEED (3).
00166                  IF DELCNT > DELH ADD 1 TO TIDELCNT
00167                  ELSE GO TO LP1.  NOTE NO DELETIONS HENCE NO DEPROCESS.
00168    016600        MOVE NCP TO A  MOVE 1 TO D.
00169    016700 LP3.        IF D > 3 GO TO P3.
00170    016800        COMPUTE C = NEWNEED (D) - A.
00171    016900        IF C > 0 MOVE C TO SHORT (D)
00172    017000        ELSE MOVE 0 TO SHORT (D).
00173    017100        ADD 1 TO D GO TO LP3.
00174    017200 P3.  IF B > 0 GO TO P4.
00175    017300        MOVE 0 TO A MOVE NCP TO B  MOVE 0 TO C.
00176    017400        IF B > 0
00177    017500             MOVE SEON TO CHKSEON
00178    017600             MOVE CALN TO CHKCALN
00179    017700             MOVE AUTH TO CHKAUTH
00180    017800        ELSE GO TO P4.
00181    017900 LP4.        IF C < B AND A < 99  ADD 1 TO A
00182    018000             ELSE GO TO P4.
00183    018100        MOVE CPF (A) TO D.
00184    018200        IF D = 0 GO TO LP4.
00185    018300        ADD 1 TO C.
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018400     IF D < 3 ADD 4 TO D
018500              MOVE A TO CHKCPY  WRITE CHKCD FROM CHKDTA
018600              ADD 1 TO MINUSCNT
018700     ELSE IF D < 5 SUBTRACT 2 FROM D.
018800     MOVE D TO CPF (A)  GO TO LP4.
018900 P4.  REWRITE MASTREC
019000              INVALID DISPLAY 'REWRITE FAILED' TRKEY SEQN.
019100     GO TO LP1.
019200 ABORT1.        CLOSE MASTER.
019300 ABORT2.        DISPLAY 'RUN CANCELED'.  STOP RUN.
019400 ENDED.  CLOSE MINUSFILE, HYSTERICAL.
019500     MOVE ZERO TO TRKEY, SEQN.
019600     READ MASTER INVALID EXHIBIT NAMED
019700              'RDTA READ2 FAILED' TRKEY SEQN  GO TO BLECH.
019800     MOVE NUTERM TO TERMA.
019900     MOVE 0 TO RUNSER.
020000     REWRITE MASTREC FROM RDTA  INVALID EXHIBIT NAMED
020100              'RDTA REWRITE FAILED' TRKEY SEQN  GO TO BLECH.
020200     CLOSE MASTER.
020300     DISPLAY 'TERM END PROCESS COMPLETE. '.
020400     DISPLAY 'NUMBER OF TITLES HAVING COURSES DELETED = ' TIDELCNT
020500     DISPLAY 'TOTAL NUMBER OF COURSES DELETED = ' DELCNT
020600     DISPLAY 'TOTAL NUMBER "CPF" CARDS PRODUCED = ' MINUSCNT.
020700     DISPLAY 'UPDATED FILE STATUS: ' RDTA.
020800     DISPLAY 'NEXT REGULAR RUN MUST BE RUN=0001.'.
020900     STOP RUN.
021000 BLECH.  DISPLAY 'PROCESS COMPLETE, BUT CANNOT UPDATE FILE STATUS'
021100     DISPLAY 'FILE STATUS REMAINS AS SHOWN ABOVE.'.
021200     CLOSE MASTER  STOP RUN.
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00001          IDENTIFICATION DIVISION.                                       00000100
00002          PROGRAM-ID. 'RESVPROF'.                                        00000200
00003          AUTHOR. H.J.HETLAND.                                           00000300
00004          ENVIRONMENT DIVISION.                                          00000400
00005          INPUT-OUTPUT SECTION.                                          00000500
00006          FILE-CONTROL.                                                  00000600
00007              SELECT MASTER-FILE ASSIGN 'MASTER' DIRECT-ACCESS           00000700
00008              ORGANIZATION DIRECT  ACCESS RANDOM                         00000800
00009              SYMBOLIC SEQNFF  ACTUAL TRKEY.                             00000900
00010              SELECT PROFLIST ASSIGN 'PROFLIST' UTILITY RESERVE 5.       00001000
00011          I-O-CONTROL.                                                   00001100
00012              APPLY RESTRICTED SEARCH 1 ON MASTER-FILE.                  00001200
00013          DATA DIVISION.                                                 00001300
00014          FILE SECTION.                                                  00001400
00015          FD  MASTER-FILE                                                00001500
00016              RECORDING F LABEL RECORD STANDARD DATA RECORD MASTER-RECORD. 00001600
00017          01  MASTER-RECORD.                                             00001700
00018           02     PR        PICTURE 9    COMPUTATIONAL-3.                00001800
00019           02     BIB.                                                   00001900
00020            03      AUTH    PICTURE X(76).                               00002000
00021            03      TITL    PICTURE X(76).                               00002100
00022            03      EDTN    PICTURE X(10).                               00002200
00023            03      DATN    PICTURE X(10).                               00002300
00024            03      CALN    PICTURE X(30).                               00002400
00025            03      LCCN    PICTURE X(10).                               00002500
00026           02     INVENT.                                                00002600
00027            03      ORDR    PICTURE 99.                                  00002700
00028            03      NCP     PICTURE 99.                                  00002800
00029           02     CPFF.                                                  00002900
00030            03      CPF     PICTURE 9    COMPUTATIONAL-3  OCCURS 99.     00003000
00031           02     CRSES.                                                 00003100
00032            03      NCRSE   PICTURE 99   COMPUTATIONAL-3.                00003200
00033            03      TNEED   PICTURE 99   OCCURS 3.                       00003300
00034            03      SHORT   PICTURE S99  OCCURS 3.                       00003400
00035            03      CRSF                 OCCURS 8.                       00003500
00036             04      NEED   PICTURE 99.                                  00003600
00037             04      CID.                                                00003700
00038              05      TERM PICTURE 999.                                  00003800
00039              05      CRID.                                              00003900
00040               06      CRSE PICTURE X(15).                               00004000
00041               06      PROF PICTURE X(15).                               00004100
00042         FD  PROFLIST  RECORDING F  LABEL RECORD OMITTED                 00004200
00043             BLOCK 5 RECORDS
00044             DATA RECORD PREC.                                           00004300
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           01  PREC.                                                    00004400
            02  FILLER  PICTURE X.                                      00004500
            02  FILLER  PICTURE X(132).                                 00004600
           SD  SFILE  RECORDING F  DATA RECORD SREC.                    00004700
           01  SREC.                                                    00004800
            02  SORF   PICTURE X.                                       00004900
            02  SCRID.                                                  00005000
             03  SPROF  PICTURE X(15).                                  00005100
             03  SCRSE  PICTURE X(15).                                  00005200
            02  SBIB.                                                   00005300
             03  SAUTH  PICTURE X(76).                                  00005400
             03  STITL  PICTURE X(76).                                  00005500
             03  SEDTN  PICTURE X(10).                                  00005600
             03  SDATN  PICTURE X(10).                                  00005700
             03  SCALN  PICTURE X(30).                                  00005800
           WORKING-STORAGE SECTION.                                     00005900
           77  AA  PICTURE 999.                                         00006000
           77  A  PICTURE S99 COMPUTATIONAL.                            00006100
           77  B  PICTURE S99 COMPUTATIONAL.                            00006200
           77  CRSCNT  PICTURE S99  COMPUTATIONAL.                      00006300
           77  CRSPG  PICTURE S99 COMPUTATIONAL  VALUE 16.              00006400
           77  CT1  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006500
           77  CT2  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006600
           77  CT3  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006700
           77  CT4  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00006800
           77  CT5 PICTURE ZZ.9.                                        00006900
           77  CT6  PICTURE S9(6)  COMPUTATIONAL  VALUE 0.              00007000
           77  ORF  PICTURE X.                                          00007100
           77  PGCNT  PICTURE S9999  COMPUTATIONAL  VALUE 0.            00007200
           77  TRKEY  PICTURE S9(5) COMPUTATIONAL.                      00007300
           01  HCRID.                                                   00007400
            02  HPROF  PICTURE X(15).                                   00007500
            02  HCRSE  PICTURE X(15).                                   00007600
           01  PAREAS.                                                  00007700
            02  H1.                                                     00007800
             03  FILLER  PICTURE X(38)  VALUE SPACE.                    00007900
             03  HDTXT  PICTURE X(15)  VALUE 'COLLEGE LIBRARY'.         00008000
             03  FILLER  PICTURE X(19)  VALUE SPACE.                    00008100
             03  HDATE   PICTURE X(8).                                  00008200
             03 FILLER  PICTURE X(4) VALUE SPACE.                       00008300
             03  PAG  PICTURE X(5)  VALUE SPACE.                        00008400
             03  PGNO  PICTURE ZZZZ.                                    00008500
            02  H2.                                                     00008600
             03  FILLER  PICTURE X(7)   VALUE SPACE.                    00008700
             03  FILLER  PICTURE X(11)  VALUE 'PROFESSOR: '.            00008800
             03  PPROF   PICTURE X(15).                                 00008900
             03  FILLER  PICTURE X(22)  VALUE '   RESERVE LIST FOR: '.  00009000
           03  PCRSE   PICTURE X(15).                                00009100
           03  FILLER  PICTURE X       VALUE SPACE.                  00009200
           03  HTERM   PICTURE X(6).                                 00009300
           03  FILLER  PICTURE XXX     VALUE ' 19'.                  00009400
           03  HYEAR   PICTURE XX.                                   00009500
           03  FILLER  PICTURE X(7) VALUE SPACE.                     00009600
           03  PGN2  PICTURE ZZZZ.                                   00009700
          02  PLIN.                                                  00009800
           03  FILLER  PICTURE X(10)  VALUE SPACE.                   00009900
           03  PAUTL.                                                00010000
            04  TBLNK   PICTURE XXXX.                                00010100
            04  PTITL   PICTURE X(76).                               00010200
            04  PEDDACA  REDEFINES PTITL.                            00010300
             05  PEDTN  PICTURE X(10).                               00010400
             05  FILLER PICTURE XX.                                  00010500
             05  PDATN  PICTURE X(10).                               00010600
             05  FILLER PICTURE XX.                                  00010700
             05  PCALN  PICTURE X(30).                               00010800
          01  RUNTERM.                                               00010900
           02  RTA  PICTURE XX.                                      00011000
           02  RTB  PICTURE 9.                                       00011100
          01  TRMS.                                                  00011200
           02  TRM  OCCURS 3.                                        00011300
            03  TRA  PICTURE 99.                                     00011400
            03  TRB  PICTURE 9.                                      00011500
          01  HTERMSV  PICTURE X(18)  VALUE 'SPRINGSUMMER  FALL'.    00011600
          01  HTERMSF  REDEFINES HTERMSV.                            00011700
           02  HTERMS  PICTURE X(6)  OCCURS 3.                       00011800
          01  SEQNFF.                                                00011900
           02  SEQN  PICTURE 9(6).                                   00012000
           02  SEQF REDEFINES SEQN.                                  00012100
            03  ASEQND  PICTURE 9(5).                                00012200
            03  ASEQNE  PICTURE 9.                                   00012300
           02  ASEQNS  REDEFINES SEQN.                               00012400
            03  ASEQN  PICTURE 9  OCCURS 6.                          00012500
          01  RDTA.                                                  00012600
           02  RUNSER  PICTURE 9999.                                 00012700
           02  FILLER  PICTURE X.                                    00012800
           02  DATE  PICTURE X(8).                                   00012900
           02  FILLER  PICTURE X.                                    00013000
           02  TERMA  PICTURE 999.                                   00013100
           02  FILLER  PICTURE X.                                    00013200
           02  LRTP  PICTURE X(7).                                   00013300
           02  FILLER  PICTURE X.                                    00013400
           02  FILLER  PICTURE X(5).                                 00013500
           02  HDIN  PICTURE 9.                                      00013600
           02  FILLER  PICTURE X(5).                                 00013700
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 02  HOUT  PICTURE 9.                                             00013800
 02  FILLER  PICTURE X(5).                                        00013900
 02  HWIN  PICTURE 9.                                             00014000
 02  FILLER  PICTURE X(5).                                        00014100
 02  HEXT  PICTURE 9.                                             00014200
 02  FILLER  PICTURE X.                                           00014300
 02  FUNSEQ  PICTURE 9(5).                                        00014400
 02  FSEQNE  PICTURE 9.                                           00014500
 02  FILLER  PICTURE X.                                           00014600
 02  LDATE  PICTURE X(8).                                         00014700
PROCEDURE DIVISION.                                               00014800
MAIN-STUFF SECTION.                                               00014900
    OPEN I-O MASTER-FILE MOVE 0 TO TRKEY, SEQN.                   00015000
    READ MASTER-FILE INTO RDTA INVALID DISPLAY 'LABELBOMB'        00015100
        GO TO BOMB.  DISPLAY 'FILE AS OF ' RDTA.                  00015200
    MOVE TERMA TO TRM (1) TRM (2) TRM (3) GO TO T123 T231 T312   00015300
    DEPENDING TRB (1).                                            00015400
T123. MOVE 2 TO TRB (2) MOVE 3 TO TRB (3) GO TO TEX.              00015500
T231. MOVE 3 TO TRB (2) MCVE 1 TO TRB (3) ADD 1 TO TRA (3) GO TO  00015600
    TEX.                                                          00015700
T312. MOVE 1 TO TRB (2) MCVE 2 TO TRB (3) ADD 1 TO TRA (2) ADD 1  00015800
    TO TRA (3).                                                   00015900
TEX. ACCEPT RUNTERM. DISPLAY 'RUNTERM=' RUNTERM.                  00016000
                    IF RUNTERM = TRM (1) OR TRM (2) OR TRM (3)    00016100
    NEXT SENTENCE ELSE DISPLAY 'TERMBOMB' GO TO BOMB.             00016200
    MOVE HTERMS (RTB) TO HTERM MOVE RTA TO HYEAR MOVE             00016300
    DATE TO HDATE. DISPLAY 'ENTER SORT'.                          00016400
    SORT SFILE ASCENDING SCRID SCRF SAUTH STITL                   00016500
    INPUT PROCEDURE INPUT-STUFF                                   00016600
    OUTPUT PROCEDURE OUTPUT-STUFF.                                00016700
    IF TALLY NOT = 0 DISPLAY 'SORT FAILED' ELSE                   00016800
    DISPLAY 'PROFLIST COMPLETE'.  STOP RUN.                       00016900
BOMB. CLOSE MASTER-FILE DISPLAY 'BOMBED' STOP RUN.                00017000
INPUT-STUFF SECTION.                                              00017100
NEXTIN. ADD 1 TO ASEQND IF ASEQND > FUNSEQ GO TO ENDIN.           00017200
    COMPUTE AA = ASEQN (2) * ASEQN (4) + ASEQN (1) + ASEQN (3)    00017300
    + ASEQN (5). MOVE AA TO ASEQNE. COMPUTE TRKEY = ASEQND / 5.   00017400
    READ MASTER-FILE INVALID DISPLAY 'READ FAILURE. SEQN=' SEQNFF00017500
    GO TO NEXTIN. IF PR = 0 GO TO NEXTIN. ADD 1 TO CT1.           00017600
    MOVE SPACE TO ORF.                                            00017700
    IF TNEED (RTB) > 0 ADD 1 TC CT6 THEN                          00017800
      IF NCP = 0 MOVE 'X' TO ORF THEN                             00017900
        IF ORDR = 0 MOVE HIGH-VALUE TO SCRID MOVE BIB TO SBIB     00018000
            MOVE 'Y' TO SCRF RELEASE SREC ADD 1 TO CT2.           00018100
    MOVE 1 TO A MOVE NCRSE TO B.                                  00018200
TST1. IF A > B GO TO NEXTIN. IF TERM (A) NOT = RUNTERM            00018300
      ADD 1 TO A GO TO TST1.  ADD 1 TO CT3.                       00018400
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                                                                        00018500
           MOVE PROF (A) TO SPROF MOVE CRSE (A) TC SCRSE. MOVE BIB TO   00018600
           SBIB MCVE ORF TO SORF RELEASE SREC. ADD 1 TO A GO TO TST1.   00018700
       ENDIN. DISPLAY 'END OF INPUT PHASE' CLOSE MASTER-FILE.           00018800
           COMPUTE CT4 = CT2 + CT3. CCMPUTE CT5 RCUNDED = CT3 / CT6.    00018900
           DISPLAY 'MASTER TITLES ' CT1                                 00019000
           ' PROFLIST TITLES ' CT6                                      00019100
           ' COURSES/TITLE ' CT5                                        00019200
           ' INVENTORY CHECKS ' CT2                                     00019300
           ' TOTAL SORTIN ' CT4.                                        00019400
       OUTPUT-STUFF SECTION.                                            00019500
           OPEN CUTPUT PROFLIST. MOVE SPACE TO HCRID.                   00019600
           MOVE 0 TO CT1, CT3.                                          00019700
       NOW. RETURN SFILE END GO TO ENCPROF.                             00019800
           IF SCRID = HCRID GO TC SAMECRID. MOVE SCRID TO HCRID.        00019900
           IF SORF = 'Y' MOVE SORF TO ORF GC TO ENDPROF.                00020000
       NEWCRID. MOVE SPRCF TO PPROF MOVE SCRSE TO PCRSE.                00020100
           ADD 1 TO PGCNT MOVE PGCNT TC PGNO. MOVE SPACE TO ORF.        00020200
           WRITE PREC FROM H1 AFTER 0 WRITE PREC FROM H2 AFTER 2.       00020300
           ADD 1 TO CT1.                                                00020400
       BSKIP. MOVE SPACE TO PREC WRITE PREC AFTER 2. MOVE 0 TO CRSCNT.  00020500
       SAMECRID. IF SORF > ORF GC TO ORDRD.                             00020600
                IF CRSCNT > CRSPG GO TC OVERFLOW.                       00020700
       PRTCRS. MOVE SAUTH TO PAUTL WRITE PREC FROM PLIN AFTER 1.        00020800
           MOVE SPACE TO TBLNK. MOVE STITL TO PTITL WRITE PREC FROM     00020900
           PLIN AFTER 1. MOVE SPACE TC PTITL.                           00021000
           MOVE SEDTN TO PEDTN MCVE SDATN TO PDATN MOVE SCALN TO PCALN. 00021100
           WRITE PREC FROM PLIN AFTER 1. ACD 1 TO CRSCNT ADD 1 TO CT3.  00021200
       PRTEX. GO TO NOW. NOTE ALTER TC NOW2.                            00021300
       OVERFLOW. ADD 1 TO PGCNT MOVE PGCNT TO PGN2.                     00021400
           WRITE PREC FROM H2 AFTER 0. MOVE 0 TO PGN2.                  00021500
           MOVE '(CONTINUED FROM PREVIOUS PAGE)' TO PTITL               00021600
           WRITE PREC FROM PLIN AFTER 2.                                00021700
           IF ORF NOT = 'X' GO TC BSKIP. MOVE 0 TO CRSCNT.              00021800
       ORDRD. MOVE SORF TO ORF. IF CRSCNT NOT < CRSPG GO TO OVERFLOW.   00021900
           MOVE '***** THE FOLLOWING TITLES ARE BEING OBTAINED FOR RESER00022000
      -    'VE *****' TO PAUTL. WRITE PREC FROM PLIN AFTER 3.           00022100
           ADD 1 TO CRSCNT GO TO SAMECRID.                              00022200
       ENDPRUF. MOVE 'END OF PROFESSORS LISTS.' TO PAUTL                00022300
           WRITE PREC FROM PLIN AFTER C.                                00022400
           COMPUTE CT5 ROUNDED = CT3 / CT1.                             00022500
           IF ORF NOT = 'Y' GO TC ENDCUT.                               00022600
           ALTER PRTEX TO PROCEED TO NOW2.                              00022700
           MOVE 0 TO PGCNT MOVE 'PAGE ' TO PAG                          00022800
           MOVE 'INVENTORY CHECK' TO HDTXT. GO TO ICOVFL.               00022900
       NOW2. RETURN SFILE END GO TO ENDIC.                              00023000
           IF CRSCNT NOT > CRSPG GO TC PRTCRS.                          00023100
       ICOVFL. MOVE 0 TO CRSCNT. ADD 1 TO PGCNT. MOVE PGCNT TO PGNO.
```

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           WRITE PREC FROM H1 AFTER 0.                                  00023200
           MOVE SPACE TO PREC WRITE PREC AFTER 3. GO TO PRTCRS.         00023300
       ENDIC. MOVE 'END OF INVENTORY CHECK' TO PAUTL                    00023400
           WRITE PREC FROM PLIN AFTER 2.                                00023500
       ENDOUT. DISPLAY 'TOTAL COURSES ' CT1 ' TITLES/COURSE ' CT5.      00023600
           CLOSE PROFLIST.                                              00023700
```

```
IDENTIFICATION DIVISION.                                                00000100
PROGRAM-ID. 'XREFRESV'.
AUTHOR. H.J.HETLAND.                                                    00000300
ENVIRONMENT DIVISION.                                                   00000400
INPUT-OUTPUT SECTION.                                                   00000800
FILE-CONTROL.                                                           00000900
    SELECT MASTER ASSIGN 'MASTER' UTILITY.
    SELECT CROSSREF ASSIGN 'CROSSREF' UTILITY.
DATA DIVISION.                                                          00001600
FILE SECTION.                                                           00001700
FD  MASTER
    RECORDING F BLOCK 5 RECORDS
    LABEL RECORD STANDARD DATA RECORD MASREC.
01  MASREC.
 02      PR        PICTURE 9    COMPUTATIONAL-3.                        00002100
 02      BIB.                                                           00002200
   03      AUTH    PICTURE X(76).                                       00002300
   03  TITL.
    04  TITL4     PICTURE X(4).
    04  XMAIN     PICTURE X(72).
   03      EDTN    PICTURE X(10).                                       00002500
   03      CATN    PICTURE X(10).                                       00002600
   03      CALN    PICTURE X(30).                                       00002700
   03      LOCN    PICTURE X(10).                                       00002800
 02       INVENT.                                                       00002900
   03      CRDR    PICTURE 99.                                          00003000
   03      NCP     PICTURE 99.                                          00003100
 02       CPFF.                                                         00003200
   03      CPF     PICTURE 9    COMPUTATIONAL-3  OCCURS 99.             00003300
 02       CRSES.                                                        00003400
   03      NCRSE  PICTURE 99   COMPUTATIONAL-3.                         00003500
   03      TNEED  PICTURE 99   OCCURS 3.                                00003600
   03      SHORT  PICTURE S99  OCCURS 3.                                00003700
   03      CRSF                OCCURS 8.
    04      NEED  PICTURE 99.                                           00003900
    04      CID.                                                        00004000
     05      TERM PICTURE 999.                                          00004100
     05      CRID.                                                      00004200
      06      CRSE PICTURE X(15).                                       00004300
      06      PROF PICTURE X(15).                                       00004400
  02  SEQN     PICTURE 9(6).
FD  CROSSREF
     RECORDING F BLOCK 5 RECORDS
     LABEL RECORD OMITTED DATA RECORD PREC.
```

```
            01  PREC     PICTURE X(133).
            SD  SFILE RECORDING F DATA RECORD SREC.
            01  SREC.
             02  SMAIN  PICTURE X(72).
             02  SXREF  PICTURE X(76).
             02  SXSEQN PICTURE 9(6).
            WORKING-STORAGE SECTION.                                    00007300
            77  MCTR     PICTURE S9999 COMPUTATIONAL VALUE 0.
            77  LN       PICTURE S9999 COMPUTATIONAL VALUE 50.
            77  LNCT     PICTURE S9999 COMPUTATIONAL VALUE 0.
            77  PGCT     PICTURE S9999 COMPUTATIONAL VALUE 0.
            77  XCTR     PICTURE S9999 COMPUTATIONAL VALUE 0.
            01  PCC.
             02  PC      PICTURE  9 COMPUTATIONAL-3 VALUE 0.
            01  PHEAD.
             02  FILLER     PICTURE X.
             02  FILLER  PICTURE X(51) VALUE
                '      RESERVES CROSS REFERENCES BY MAIN ENTRY AS OF '.
             02  HDATE      PICTURE X(8).
             02  FILLER     PICTURE X(9) VALUE '    PAGE '.
             02  PGN        PICTURE Z(4).
            01  MLIN.
             02  FILLER PICTURE X.
             02  PMAIN      PICTURE X(72).
            01  XLIN.
             02  FILLER     PICTURE X.
             02  FILLER     PICTURE X(7) VALUE '    X  '.
             02  PXREF      PICTURE X(76).
             02  FILLER     PICTURE XX VALUE SPACE.
             02  PXSEQN     PICTURE 9(6).
            01  RDTA.                                                   00007900
             02  RUNSER  PICTURE 9999.                                  00008000
             02  FILLER  PICTURE X.                                     00008100
             02  DATE  PICTURE X(8).                                    00008200
             02  FILLER  PICTURE X.                                     00008300
             02  TERMA  PICTURE 999.                                    00008400
             02  FILLER  PICTURE X.                                     00008500
             02  LRTP  PICTURE X(7).                                    00008600
             02  FILLER  PICTURE X.                                     00008700
             02  FILLER  PICTURE X(5).                                  00008800
             02  HDIN  PICTURE 9.                                       00008900
             02  FILLER  PICTURE X(5).                                  00009000
             02  HOUT  PICTURE 9.                                       00009100
             02  FILLER  PICTURE X(5).                                  00009200
             02  HWIN  PICTURE 9.                                       00009300
             02  FILLER  PICTURE X(5).                                  00009400
             02  HEXT  PICTURE 9.                                       00009500
```

```
               02  FILLER  PICTURE X.                                      00009600
               02  FUNSEC  PICTURE 9(5).                                   00009700
               02  FSEQNE  PICTURE 9.                                      00009800
               02  FILLER  PICTURE X.                                      00009900
               02  LDATE  PICTURE X(8).                                    00010000
                                                                           00010800
           PROCEDURE DIVISION.
               SORT SFILE ASCENDING SREC
                   INPUT PROCEDURE IN-PROC
                   OUTPUT PROCEDURE OUT-PROC.
               IF TALLY = 0 DISPLAY 'CROSSREF COMPLETE. '
                   MCTR ' MAIN ENTRIES LISTED.'
               ELSE DISPLAY 'SORT FAILED.'.
               STOP RUN.
           IN-PROC SECTION.
               OPEN INPUT MASTER.
               READ MASTER INTO RDTA END DISPLAY 'NO MASTER FILE.' STOP RUN.
               DISPLAY 'USING FILE AS OF ' RDTA.
           LP1.    READ MASTER END GO TO ENDIN.
               IF PR = POC GO TO LP1.
               IF TITL4 NOT = 'SEE ' GO TO LP1.
               ADD 1 TO XCTR.
               MOVE XMAIN TO SMAIN. MOVE AUTH TO SXREF. MOVE SEQN TO SXSEQN.
               RELEASE SREC GO TO LP1.
           ENDIN.  CLOSE MASTER.
               DISPLAY 'END OF INPUT. ' XCTR ' CROSS REFERENCES FOUND.'.
           OUT-PROC SECTION.
               OPEN OUTPUT CROSSREF.
               MOVE DATE TO HDATE.
               COMPUTE LNCT = LN + 1.
           LP2.    RETURN SFILE END GO TO ENDOUT.
               IF SMAIN = PMAIN GO TO SAMES.
               IF LNCT > LN MOVE 0 TO LNCT
                   ADD 1 TO PGCT MOVE PGCT TO PGN
                   WRITE PREC FROM PHEAD AFTER 0.
               MOVE SMAIN TO PMAIN.
               WRITE PREC FROM MLIN AFTER 2.
               ADD 2 TO LNCT. ADD 1 TO MCTR.
           SAMES.  MOVE SXREF TO PXREF.
               MOVE SXSEQN TO PXSEQN.
               WRITE PREC FROM XLIN AFTER 1.
               ADD 1 TO LNCT GO TO LP2.
           ENDOUT. MOVE 'END OF CROSS REFERENCE LIST.' TO PMAIN.
               WRITE PREC FROM MLIN AFTER 2.
               CLOSE CROSSREF.
```